

# **GLOBAL CONSERVATION PROGRAM**

**1<sup>st</sup> Semi-Annual Progress Report**

**October 1, 1999 – May 31, 2000**

**for**

**World Wildlife Fund**



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## **Global Conservation Program Activity Report** **For World Wildlife Fund**

### **1. Summary of Activity Status and Progress**

#### ***INTRODUCTION***

To pave the way in achieving WWF's global goal of conserving biodiversity in the Global 200, the ECOSNature Project seeks to conserve the full extent of biodiversity in the Southwest Amazon, Atlantic Forests, Forests of the Lower Mekong, Sulu-Suluwesi Seas and Bering Sea ecoregions. These provide testing grounds to strengthen the tool of Ecoregion-based Conservation (ERBC) and its broad application globally by assessing its implementation in these locations and analyzing and communicating lessons learned.

The first six months of the ECOSNature Project reflect the rapid progress being made across the WWF Network in rolling out ERBC as a core conservation strategy. These efforts are well under way to addressing key threats that are local, ecoregional and global in nature.

#### ***HIGHLIGHTS***

- Highly qualified coordination team established.
- Ecoregional Biodiversity Vision for the Bering Sea completed.
- Ecoregional Biodiversity Vision for Southwestern Amazon, Atlantic Forest, Lower Mekong drafted with key experts. For all three of these ecoregions it was an unprecedented opportunity to gather expertise and knowledge from across the borders.
- In preparation for the Ecoregional Biodiversity Vision for Sula-Sulawesi, a biological assessment in Northern Sulawesi and Eastern Kalimantan was completed.
- Combating toxics in the Bering Sea:
  - ⇒ Initiated a community-monitoring program at pilot villages.
  - ⇒ Supported an Arctic Environmental Atlas in the Russian language that demonstrates the flow of contaminants in the Bering Sea.

**TABLE OF ACTIVITY STATUS**

Activity Number	Activity Title	Status*	Page number
<b>1. Project Management</b>			
1.1	Establish coordination team	Completed	7
1.2	Facilitate key activities and communication as opportunities for exchange and learning to advance ERBC implementation	On-Track	7-8
1.3	Facilitate innovative grants	On-Track	8-9
1.4	Establish a conservation foundation in Bolivia	Mixed	10
<b>2. Bering Sea</b>			
2.1	Establishment of Marine Zone for Nalychevo Nature Park	On-Track	12
2.2	Sociological survey in the Karaginsky Bay	On-Track	12-13
2.3	Joint venture survey of sea otter population in Kommandorsky Zapovednik (Nature Reserve)	On-Track	13
2.4	Supporting multiple strategy activities for a comprehensive ERBC approach, such as education, professional development for educators, and addressing a variety of threats, particularly fisheries management	On-Track	13-14
2.5	Other Activities	On-Track	14-19
2.5.1	⇒ Improving Fisheries Management in Russian Waters		15
2.5.2	⇒ Developing priorities for Biodiversity conservation in the Bering Sea		15-16
2.5.3	⇒ Creating Economic Incentives for a Sustainable Fishery		16
2.5.4	⇒ Engaging Local Communities		17
2.5.5	⇒ Promoting conservation in the ecoregion through education and media outreach		17-19
2.5.6	⇒ Providing Technical Support to Russian Protected Areas		19

<b>3. Southwestern Amazon</b>			
3.1	Consolidation of an ecological conservation corridor (Amboro-Madidi)		22
3.1.1	⇒ SWA coordinator (WWF) and SERNAP advisor coordinate and facilitate the initiation of a collaborative structure for defining and managing the corridor	Delayed	22
3.1.2	⇒ Gather information (field-based and from databases) to establish a complete and updated biological and sociological database for the corridor	On-Track	22-23
3.1.3	⇒ Conduct analysis of biological and socio-economic data, and designed Biodiversity Monitoring and Evaluation System	Mixed Performance	23
3.1.4	⇒ Initiate development of Ecological Corridor Conservation Plan and Biodiversity Monitoring and Evaluation System	Delayed	23-24
3.1.5	⇒ Initiate development of Biodiversity Monitoring and Evaluation System with the ECWG	Delayed	24
<b>4. Atlantic Forest</b>			
4.1	Mobilize conservation action on an Ecoregional scale:		
4.1.1	⇒ Establish the institutional relationships and develop a mechanism for coordination of Atlantic Forest activities in Paraguay and Paraguayan participation in Ecoregion-wide activities.	On-Track	27-28
4.1.2	⇒ Establishment and implementation of Internal organization and action plan for Tri-national Forest Corridor network.	On-Track	28-29
4.1.3	⇒ Strengthening of Atlantic Forest network organizations and integration with WWF strategies.	On-Track	29
4.1.4	⇒ Biological vision for Interior Atlantic Forest and Araucaria Ecoregions.	On-Track	30

4.2	Protect key sites and Wildlife populations		
4.2.1	⇒ Policy framework established for improved protection and management of existing protected areas	On-Track	30
4.2.2	⇒ Continued implementation of integrated conservation and development projects to protect 3 key sites: Poço das Antas; Una; and the Misiones Tri-National Forest Corridor	On-Track	30
	a. Poço das Antas region (Rio de Janeiro, Brazil, coastal forest) forest fragments supporting a minimum viable population of golden lion tamarins	On-Track	30
	b. Minimum viable contiguous forest conserved to assure conservation of a viable population of golden-headed lion tamarins - Una region (Southern Bahia state, coastal forest, Brazil)	On-Track	31-32
	c. Misiones Tri-National Green Corridor recognized and made viable	On-Track	32
4.2.3	⇒ New protected areas created and implemented		
	a. Priorities established for creation of new protected areas	On-Track	32
	b. Threats to integrity of Ecoregion assessed and prioritized	On-Track	33
	c. Integrated tri-national Geographic Information System (GIS) map/database established for the Ecoregion		33
4.3	Shape regional development to support conservation	Mixed Performance	33-35
4.4	Establish long-term conditions and capacities needed to sustain conservation	Mixed Performance	35-37
<b>5. Lower Mekong</b>			
5.1	Provide support and guidance to the government of Lao PDR in regard to its ascension to CITIES	Delayed	39
5.1.1	⇒ Production of awareness materials providing an overview of CITIES and its implementation	Delayed	39-40
5.1.2	⇒ Translation of relevant CITIES documentation into Lao language for use by decision-makers	Delayed	40
5.1.3	⇒ Conduct a national level workshop in cooperation with the Wildlife Conservation Society, IUCN, and Traffic Indochina	Delayed	40
5.1.4	⇒ Directed discussions with key decision-makers within the relevant line ministries	Delayed	40

5.2	Increase awareness and understanding of the effect of illegal Wildlife Trade at all levels of government	Delayed	40
5.2.1	⇒ Facilitate dialogue between the Ministry of Agriculture and Forestry of the Lao Government with the Ministry of Interior, and Ministry of Defense to specifically address the issue of Wildlife Trade	Delayed	40
5.2.2	⇒ Continued participation of WWF in the Lao National Working Group for Wildlife Regulations, in order to develop appropriate regulations for Wildlife and Wildlife Trade in cooperation with the Lao Government	Delayed	40
5.3	Strengthen law enforcement capacity at border crossings and other field sites	Delayed	40-41
5.3.1	⇒ Improve training capacity at the level for Wildlife Trade enforcement	Delayed	41
5.3.2	⇒ Improve the law enforcement capacity at eight border crossings between Lao, Vietnam, and Thailand	Delayed	41
<b>6. Sulu-Sulawesi</b>			
6.1	Enhancing Conservation Action at Critical Sites within the SSME:		46-50
6.1.1	⇒ Tubbataha Reefs National Marine Park;	On-Track	47-48
6.1.2	⇒ Anilao Municipal Marine Protected Area, Balayan Bay, The Philippines;	On-Track	48-49
6.1.3	⇒ Improved coastal resources management at Bunaken National Park, Indonesia;	On-Track	49
6.1.4	⇒ Environmental education and management at Semporna Islands project, Malaysia.	On-Track	49-50
6.2	Improving Awareness and Understanding of the Importance of Marine Conservation in Critical Sites in the SSME (focus on Palawan)	On-Track	50-51
6.3	Increasing Understanding of Conservation Priorities and Needs Across North Sulawesi and East Kalimantan as part of the ERBC Planning Process	On-Track	51-52
6.4	Using market forces to transform the marine ornamentals industry in the Philippines and Indonesia into one based on quality and sustainable use of coral reefs by developing third party certification system	Mixed Performance	52-55

\* Status may include activities that are completed, on-track, delayed, mixed performance, or cancelled.



## **PROJECT MANAGEMENT**

### **SUMMARY**

To achieve coherent administration and learning on ERBC efforts in the ECOSNature ecoregions, core project management plays an essential function of coordinating communication and facilitating learning across ecoregions. The first six months launched a project management team that coordinates administrative reporting and technical learning. This includes managing small grants to spur innovative implementation, facilitating meetings and workshops for peer learning and capturing lessons to be shared through a variety of communication media. These are detailed below.

### **ACTIVITY DESCRIPTION**

#### **1.1 ESTABLISH A COORDINATION TEAM**

With the hiring of Sarah Christiansen as program officer, Vanessa Prada as project coordinator and Kimberley Marchant as administrative assistant, a well-qualified team is now in place to administer the ECOSNature Project under the guidance of Sheila O'Connor, the ERBC Unit Coordinator. This will be invaluable, as ecoregion implementation is underway to facilitate reporting and capture lessons to advance our learning on ERBC in these key ecoregions.

#### **1.2 FACILITATE KEY ACTIVITIES AND COMMUNICATION AS OPPORTUNITIES FOR EXCHANGE AND LEARNING TO ADVANCE ERBC IMPLEMENTATION**

##### **ERBC Workshop**

In the first part of this fiscal year, a workshop was held in November that provided an opportunity for lead ecoregional staff to share experience, discuss common challenges and garner the commitment for ERBC from senior WWF staff across the network. Several action steps were identified to move learning on ERBC forward to another level. (A summary of this workshop is included as appendix A).

##### **NGO Workshop**

On-track and dates are now being negotiated for a workshop in the fall that will provide a forum for exchange between GCP partners and other organizations who are undertaking large-scale conservation approaches. For instance, one aspect that is currently on the table is

how to measure progress at ecoregional scales thus a part of the workshop will focus on monitoring and evaluation.

#### Communication products

Several mechanisms are products for communicating learning about ERBC are in progress. The WWF Intranet site is complete and provides staffs access to the latest information and thinking on ERBC. The scale of information that is emerging is prompting further development of the intranet to be a database driven site from which field staff from across WWF will be able to search for and access information in a user friendly way. The demand for more exchange beyond WWF is also prompting plans for an Internet site that allows for public access to ERBC information.

ERBC is now a distance learning core course in the WWF College for Conservation Leadership. This course has helped to explore creative ways to produce a training product that captures the fundamental concepts of ERBC with examples from ecoregions now underway. We have partnered with the University of Bath, which has a long history of experience with distance learning, to provide technical assistance in facilitating and development of training materials. This will be on-line by the fall with an accompanying CD-ROM that will be tested with WWF College participants then used broadly as an information resource tool that introduces ERBC.

#### Guidelines and tools

The workbook for undertaking biological assessments and developing Biodiversity visions is all but complete for terrestrial and in draft for freshwater and marine. Other resource guidelines specifically geared for ERBC are in progress and include a stakeholder resource book, indigenous people's guidelines, and addressing economic incentives within ecoregions.

#### Addressing global threats

In the first half of this fiscal year, efforts in the Bering Sea are underway to link monitoring of toxics from the local to global level (described in the Bering Sea section). Further efforts to address global threats such as climate change in the next half of this fiscal year will specifically support understanding links at the ecoregional scale.

### **1.3 FACILITATE INNOVATIVE GRANTS**

There have been many approaches to the reconnaissance stage of ERBC - some just desk studies used to get the process rolling, others involving a wide range of stakeholders and field visits. In an effort to analyze the costs and benefits of undertaking a thorough reconnaissance

process, innovative grants provided support for two different models of reconnaissance in the Carpathians and in the East Africa Marine ecoregions. Each was tailored to the contexts of the ecoregion and both provided insightful understanding to help guide other ecoregions in the ERBC process. For instance, in the Carpathians, representative consultants worked separately in each country under the guidance of the ecoregion coordinator in a process that gathered critical information for understanding key or urgent issues to address in next steps. An important aspect of the Carpathian method was its multi-country, multi-layered approach that served to build a broad base of buy-in and commitment towards working at an ecoregional scale. In the East Africa Marine, a small multi-disciplinary team worked together to talk with stakeholders and scientists and explore key issues in each of the three main countries of the ecoregion - Kenya, Tanzania and Mozambique. The wealth of information gathered provides clear guidance on the next stages of ERBC and the process has fostered a series of excellent partnerships with key organizations in the ecoregion who are working on marine conservation and coastal zone management. In addition, the process has served to develop a solid team of WWF field project staff from all three countries who have not yet had the opportunity to work together. Through the Reconnaissance process WWF staff have now developed a suite of near-term actions that must take place to ensure the viability of the ecoregion as a whole, even as the ERBC assessment and visioning processes continue, such as an ecoregion-wide dugong inventory and action plan, monitoring of tuna fishing boats in the open seas, and advocating to cancel plans to build a new port in a sensitive area of Mozambique.

#### **1.4 ESTABLISH A CONSERVATION FOUNDATION IN BOLIVIA**

Several important steps were made in developing the Enterprise for the Americas Initiative Foundation (EAI) in Bolivia as an important mechanism for sustaining funding for ERBC in the region.

- In May, the US Government and the Bolivian Government signed the amendment to transfer the EAI funds and management out of FONAMA.
- WWF hired and supervised a lawyer to finalize the by-laws, regulations and act of constitution for the newly established EAI Fund. The draft documents have just been submitted and should be finalized by the end of May. The lawyer will then process the documents through the proper legal channels to legalize the new Foundation. The new Foundation should be up within the next six months when these documents are legalized.
- Recruitment continues for a full-time Technical Advisor to work as counterpart to the General Manager of the Foundation. (The job description is provided in an appendix.) Because we've had difficulty finding the Technical Advisor, we have developed short-term consultancies to keep the process of privatization in progress. Ruth Norris was hired to assist in the establishment of the new Foundation. In addition Jose Antonio Uzquiano was hired to work with Ruth to complement her work by writing the procedures and manuals for Foundation administration. Their terms of reference are attached in an appendix.
- Until this Technical Advisor is hired, Patricia Caffrey, Representative of the WWF Bolivia

Program Offices is acting as technical coordinator for this project to develop and oversee the consultancies and liaise with the EAI Technical Working Group in La Paz (Ministry of Sustainable Development, EAI staff, USAID and WWF).

**TABLE OF PROGRESS IN MEETING KEY ACTIVITY BENCHMARKS**

<b>Benchmark Number</b>	<b>Benchmark/Output</b>	<b>Status*</b>
1.1.1	WWF LWA coordination team established to provide the necessary programmatic, financial and administrative oversight to advance conservation impact in Ecoregions.	Completed
1.1.2	Fora and communication mechanisms established to support exchange and guidance across Ecoregions.	On-Track
1.1.3	Timely opportunities for innovative ERBC implementation actions supported in Global 200 Ecoregions	On-Track
1.1.4	Strategic technical advice provided in the establishment and development of the Enterprise for the Americas Initiative Foundation (EAI) in Bolivia to support ERBC in six Global 200 Ecoregions	Mixed Performance

\* Status may include activities that are completed, on-track, delayed, mixed performance, or cancelled.

## **BERING SEA ECOREGION**

### **OBJECTIVES**

The objective of the Bering Sea Program is to conserve the globally significant biodiversity of the Bering Sea by protecting key sites and wildlife populations, as well as shaping development policies for improved stewardship in collaboration with local communities, the private sector and US and Russian governments.



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### **COLLABORATORS/PARTNERS**

The primary partners in Russia are listed below. However, this does not fully demonstrate the breadth of our partnerships and network in the Bering Sea

- Russia Program Office (WWF-International)  
Kamchatka Fisheries Management Agency (Kamchatrybvod)
- Russian Academy of Sciences (various institutes and branches, from Moscow to the Russian Far East)
- Kaira Club
- Chukotka parks administration
- *Northern Pacific* journal
- Native Association “Yupik”
- The Wild Salmon Center

### **SUMMARY**

Since World Wildlife Fund identified the Bering Sea as a key Ecoregion for conserving biodiversity, we have made significant strides in our Bering Sea program.

#### *Highlights:*

- Completing a Biodiversity assessment for the Ecoregion, outlining the priority areas for conservation;
- Completing the final stage of a study of illegal fishing in the western Bering Sea;
- Initiating a 13-part radio show series on the science and stewardship of the Bering Sea, in English and Russian.

## **ACTIVITY DESCRIPTION**

### **2.1 ESTABLISHMENT OF MARINE ZONE FOR NALYCHEVO NATURE PARK**

A proposal to establish a strictly protected marine zone located in the northern part of the Avacha Bay and bordering the Nalychvo Nature Park was elaborated. The planned area of the marine zone is about 25,000 hectares. All relevant documents have been transferred to the local authorities for further approval. In June 2000, a documentation package, after being approved by the Governor of Kamchatka, will be transferred to the State Committee for Nature Conservation of Russia for final ratification, which is expected in July.

Construction materials have been purchased, to construct two ranger stations on the coast of the Avacha Bay. Fish inspectors and rangers while patrolling the marine zone of the Nalychvo Nature Park will use the ranger stations. Construction of a ranger station located on the Nalychvo Cape is under way and expected to be finished by the end of June 2000.

### **2.2 SOCIOLOGICAL SURVEY IN THE KARAGINSKY BAY**

In October 1999 WWF experts collected data and conducted mapping of the Karaginsky Island, in the area of Ossora settlement and Karaga Koryak national village. Based on the results of this research, several maps (both Russian and English versions) were prepared. These maps represent traditional hunting and fishing grounds of local native people, the areas of cultural-historical and devout importance for local indigenous communities, as well as the proposed protected areas of traditional nature use. An analysis of the current condition of traditional land use has been conducted. WWF experts have elaborated a proposal on establishment of the areas of traditional nature use and their further development. The Administration of the Karaginsky Island and the local office of RAIPON (Russian Association of Indigenous People of the North) have sent an official letter to WWF Russian Program Office (WWF RPO), that contained a suggestion to establish eight protected areas of traditional nature use (of different size) on the territory of Karaginsky district.

Apart from the mapping, a sociological survey was conducted by a group of sociologists from Petropavlovsk-Kamchatski in Karga village of Karaginsky island, to assess attitude of the local population towards establishment of the protected areas of traditional nature use, as well as the intention of native people to move to these areas. The survey was conducted among 150 local people (every third adult citizen) of the village. The survey showed, that in spite of the fact that most of the local people are losing their traditional knowledge and are not interested in maintaining their traditional lifestyle, 30% of the respondents, mainly the young ones, are interested in moving to the protected areas and use the natural resources of their land in a traditional way.

WWF RPO suggests conducting a three-year project, with the objective to establish one or two model protected areas of traditional nature use. Using the model of WWF work in Kamchatka to establish Tkhsanom Traditional Nature Use Protected Area, to insure

participation of the local people in managing the reserves in a traditional way.

### **2.3 JOINT RUSSIAN SURVEY OF SEA OTTER POPULATION IN KOMMANDORSKY ZAPOVEDNIK (NATURE RESERVE)**

On several Aleutian Islands, sea otter populations have plummeted in the last decade - by 90% in some areas! Sea lions have decreased by 50-80% throughout the Bering Sea, and have been listed as endangered. Are these animals' harbingers of adverse change in the Ecoregion? We need to know more about the status of the populations. Therefore WWF is working in cooperation with the U.S. Fish & Wildlife Service (USFWS).

While the USFWS will conduct the survey along the Aleutian Island chain, WWF will help complete the picture throughout the region by paying for a survey in the Commander Islands, the westernmost extension of this southern island chain. In July, a team of four Russian biologists--including an expert from the Commander Islands Nature Reserve--will depart for the islands.

### **2.4 SUPPORTING MULTIPLE STRATEGY ACTIVITIES FOR A COMPREHENSIVE ERBC APPROACH, SUCH AS EDUCATION, PROFESSIONAL DEVELOPMENT FOR EDUCATORS, AND ADDRESSING A VARIETY OF THREATS, PARTICULARLY FISHERIES MANAGEMENT**

Support for education and stewardship: In the last year, WWF has supported a number of programs in education and stewardship. In addition to supporting youth participation in the Pribilof Islands Stewardship Program (Alaska) and the Kaira Club (Russia), in August 1999, WWF provided a travel grant for a leader of the Kaira Club to visit the Pribilof Stewardship Program. The trip served as a training opportunity in which both parties exchanged information about programs and methodologies in developing conservation education programs for indigenous youth.

In Feb, 1999, Russian project coordinator from WWF, Viktor Nikiforov and the US Bering Sea coordinator, Margaret Williams, traveled together to Alaska to meet with a delegation of Russian conservationists and educators from the Chukotka region. At that time, WWF concluded contracts with three individuals who will initiate several activities, including:

- The establishment of three local chapters of the "Living Planet Club" in the Chukotka region, furnishing a classroom as the "Living Planet" center, and providing a forum through which teachers and schoolchildren will participate in outdoor educational activities. The Living Planet Clubs will support summer activities for local children
- The coordinators will help to organize a children's calendar contest around the theme of "The Bering Sea--Celebrate our Heritage, Protect Our Future;" Calendars will be prepared for 2001;
- WWF will provide support for a small teachers' workshop in Chukotka, to be lead by

Russian educators from another region of the Bering Sea, Kamchatka, where the Living Planet clubs have already been established;

- Based on the popularity of the Alaska Public Radio show, “Alaska Coastal Currents,” a series of short reports on science and stewardship in the Bering Sea, WWF initiated a new program, to be implemented by one of the Chukotka coordinators, who is a radio journalist. The show will be broadcast in Russian and Chukchi languages by radio and will cover issues on science and stewardship. It will be entitled “Chukotka Coastal Currents.”

Other educational activities include:

WWF support for Beringia Ethnic Heritage Park: In May of 2000, WWF initiated an educational program to support the development of materials and educational activities for school children living within this young park. The newly created park protects miles of important coastline that supports rich avian and mammal diversity of the Bering Sea.

### **Publications in Russian:**

In February of 2000, in cooperation with scientists from the Kamchatka Fisheries Management agency, we published a Russian-language *Field Guide to Marine Mammals and Seabirds of the Russian Far East*. This color, pocket guidebook includes scientific and common names, high-quality photographs, maps indicating seasonal ranges of each species, and descriptions of their natural histories. This is the first comprehensive, Russian-language guide of its kind. It will prove tremendously useful as an educational tool, an informational resource for observers on board fishing vessels, and a reference for Russian conservationists and others working in the region.

WWF has supported the publication of a bilingual journal, *Northern Pacific*, on marine and fisheries issues of the Russian Far East. The journal, Northern Pacific, also founded a web page which features articles and news alerts on marine conservation.

*Arctic Environmental Atlas*: Because the issue of toxins, and their point sources in Russia, continue to worry residents of the Arctic and of the Bering Sea, WWF agreed to fund a Russian-language atlas of toxic contaminants in the Arctic. This project, coordinated by Dr. Kathleen Crane of the US Naval Research Lab, involved top Russian chemists and oceanologists in analyzing chemical samples and updating a series of maps that demonstrate the flow of contaminants in the Arctic Ocean, and partially in the Bering Sea. The information is available on CD-ROM and will be provided to Russian viewers through the Internet.

## **2.5 OTHER ACTIVITIES**

### **2.5.1**

## **Improving Fisheries Management in Russian Waters**

To better understand the threat of fishing pressure in the western Bering Sea, TRAFFIC, WWF's branch that monitors trade in endangered species conducted an extensive study. In its report, which is now in review, TRAFFIC found that the majority of the fish harvested each year in Russian waters are caught illegally, resulting in losses for the Russian economy totaling \$2 billion to \$4 billion. Much of this contraband fish is then sold to Asian markets. In addition, the report describes problems in Russian enforcement including a defunct observer program and demonstrates that Russian management agencies do not have the capacity to combat the flood of illegal fishers. The report will be finalized in the summer of 2000.

In the interim, WWF has initiated several actions to address the problems of fisheries mismanagement in the western Bering Sea. WWF-Russia convened a workshop in May of 1999 to gather 60 of Russia's leading scientists and NGOs in marine conservation to discuss ways to address problems of fisheries management, industrial development, endangered species and protected areas. The experts laid out priorities for marine conservation in the Russian Far East, and WWF-Russia has hired a full-time marine program officer to help coordinate work in the Bering Sea and neighboring marine regions. WWF has begun to build a working relationship with Kamchatrybvod, the fisheries management agency in the western Bering Sea. In the fall of 1999 WWF collaborated with the Wild Salmon Center (based in Portland, Oregon) to provide cash bonuses to reward the most effective fisheries inspectors from Kamchatrybvod. The special awards provided a huge boost to underpaid and scarcely recognized inspectors. WWF and the Wild Salmon Center organized a press event around the awards ceremony, which helped to further publicize the inspectors' important work.

### **2.5.2**

#### **Developing priorities for biodiversity conservation in the Bering Sea**

After gathering 60 Bering Sea experts together in 1999 to discuss conserving the Bering Sea, WWF and The Nature Conservancy of Alaska have produced an 80-page report that was reviewed by all participants and published in English and will be translated into Russian. WWF, as well as other conservation groups, has begun using the draft report and accompanying maps as an informational resource and an advocacy tool. (See Appendix B for the biodiversity report).

The assessment describes 20 outstanding areas that are priorities for biodiversity conservation in the Bering Sea. These include areas of high endemism and species richness (such as the Pribilof Islands, where millions of seabirds nest each summer); areas of high abundance or aggregations of species (such as Norton Sound, where large concentrations of beluga whales gather to forage each summer); critical ecological phenomena (such as the Bering Strait, a migratory corridor for Pacific walrus, bowhead, beluga, and gray whales) and other important processes, such as upwellings and areas of high biological productivity.

In addition to highlighting these biodiversity priorities, the assessment outlines the significant threats to the Ecoregion and summarizes potential solutions. Among the key threats identified are mismanagement of fisheries (overfishing, destruction of ocean-bottom habitats, lack of enforcement--particularly in the western Bering Sea); toxic contamination (persistent organic pollutants and other pollutants being transported by air and water currents); climate change (the effect of rising temperatures on the ice pack and sea surface temperatures); and introduction of alien species (rats, foxes, and micro-organisms carried in ballast water).

Based on the findings in this report, WWF is pursuing conservation activities in some of the areas highlighted as priorities for biodiversity. For example, in the western Bering Sea, we learned about the rich wetlands and fisheries of Karaginsky Bay. We are now investigating current resource use regulations, as well as the use of subsistence resources there by local communities, to determine options for establishing a protected area. Further up the coast in Chukotka, we are initiating educational programs that will help to raise awareness about some of the rich wetland and marine areas that support astounding numbers of bird and mammals.

Where we are not able to begin conservation initiatives immediately, we are planning outreach activities to share information about our work. In recent months, in cooperation with The Nature Conservancy of Alaska and the Center for Marine Conservation, we have held meetings on St. Paul Island (in the Pribilofs), and in the towns of Dillingham and Unalaska to share with communities the findings of the report.

### 2.5.3

#### **Creating Economic Incentives for a Sustainable Fishery**

To create positive incentives for sustainable fishing, WWF joined with leading fishing businesses three years ago to create the Marine Stewardship Council (MSC). The MSC has established standards for responsible fishing, which are applied on a voluntary basis to fisheries around the world by independent certification firms. Fisheries that are managed in a manner consistent with the standards may use the MSC logo to distinguish their products at the point of sale. This enables consumers to identify sustainably caught seafood products and helps responsible fishing groups expand the markets for their fish.

WWF has supported the MSC's work in biologically important marine areas around the world, including the Bering Sea. The goal of this work is to assure that fishing remains within biological limits as part of a campaign that the MSC is calling "Fish Forever." Independent certifiers accredited by the MSC are currently reviewing the fishing practices of the Alaskan salmon fishery. We expect the certifiers will complete their review by this summer. WWF believes that this fishery is generally well managed and deserves to be recognized by the MSC and rewarded by environmentally conscious consumers. MSC certification would help assure the continuation of good fishing practices and create incentives for further improvement in the fishery.

#### 2.5.4

##### **Engaging Local Communities**

Without community involvement in our conservation initiative, WWF will be unable to claim any successes. From the beginning, we've attempted to consult with, and include community representatives in the development of our program. Our actions in this area are described below:

- **Native peoples' summit:** In March of 1999, WWF joined a number of Alaskan NGOs and federal agencies in sponsoring a "summit" of Native peoples of the eastern Bering Sea. The goal of the summit was to create a forum through which native Alaskans could share information and concerns about the Bering Sea environment, and to develop a conservation agenda.
- **Community participation in designing and implementing monitoring programs:** The presence of toxic contaminants in subsistence foods is a major concern articulated by communities through the Bering Sea region. Experts in the WWF-TNC Biodiversity Assessment workshop identified toxics as a key threat to biodiversity in the Ecoregion. In January of 2000, WWF initiated a community-based toxic monitoring and information program to begin answering questions people have about the levels of toxins in their food. At the invitation of local communities, Dr. Michael Smolen of WWF's Wildlife and Contaminant Program traveled to Alaska with Margaret Williams, WWF's Bering Sea Ecoregional Director. In early March and again in early April, they met with a group of Alaskan experts on human and wildlife health and then traveled to two communities where they met with tribal councils and environmental managers to discuss the project. In addition to their interest in sampling and analyzing fish, the communities want to develop a training program for young people to participate in, then perhaps later lead, the project. Dr. Smolen will work with three communities this year to implement the first phase of the monitoring program.
- **Supporting the next generation of conservationists:** In the last two years, WWF has identified a few pilot projects in education that can serve as models for the whole region, or even, perhaps, for other Ecoregions. For example, WWF (through the Women in Conservation Initiative) provided modest support to the Pribilof Islands Stewardship Program, which involves teens and younger school children in beach clean up, tourist education, fur seal disentanglement, and scientific projects. Additionally, WWF provided matching funds (in cooperation with the US Fish and Wildlife Service) to the Kaira Club, a Russian NGO that sponsors environmental education activities among children in the Anadyr region.

#### 2.5.5

##### **Promoting conservation in the Ecoregion through education and media outreach**

One of WWF's primary goals in the Bering Sea is educating the American public about the economic, biological and cultural importance of the Ecoregion. We must also work at the Ecoregional level to build a constituency that will support a conservation agenda. Toward that goal, we must provide communities with information about the problems and threats in their region. We must also consider a long-term approach to education, one that will develop young stewards in the Bering Sea, on which the region depends. Our efforts to reach these multiple targets include the following:



- Media Tour:**

In the summer of 1999, WWF organized a weeklong media tour for print and radio journalists to become more acquainted with key conservation issues in the Bering Sea. The trip resulted in a front-page article in the LA Times, a major piece in the travel section of the Washington Post, a center spread in TIME Magazine, and several stories on Alaska Public Radio. The group also included a free-lance writer, who published an excellent story in the Conservation Law journal. The Washington Post article was syndicated and picked up by 30 other papers around the country.

Time Magazine, August 16, 1999, Pg 52-54

- Alaska public opinion research:** In the fall of 1999, WWF hired the Melman Group to assess Alaskan attitudes and perceptions of the Bering Sea and its resources. Through focus groups and anonymous interviews with key opinion leaders in the state, the report's conclusions show that WWF will need to work hard to raise awareness about the Bering Sea as a distinct region of special significance. The report points out that among Anchorage residents, few believe that the Bering Sea is endangered, however, in Unalaska, a major fishing community, the public is clearly concerned about the current condition of marine resources. In terms of trusted information sources, government agencies ranked low as "messengers" while scientists ranked high. While terms such as "protection" and "conservation" were greeted with rancor, the term "resource management" was agreeable to the public. Thus, WWF's role as a neutral broker based in science and striving for sustainable resource management must be stressed in future public presentations.
- Public radio series:** In the first three months of 2000, WWF provided a grant to Alaska Public Radio to produce a 13-part series on science and stewardship in the Bering Sea. The reports covered diverse issues such as coastal communities' concerns about contaminants in subsistence foods; the decline in sea otters; plankton blooms in the Bering Sea; kids in conservation and more. We are initiating a similar

program in Russia, to be called “Chukotka Coastal Currents,” for broadcast throughout coastal communities in northeastern Chukotka. The show will be broadcast in Russian and Chukchi native languages.

- Earth Day media message: Throughout the week preceding Earth Day 2000, WWF used the radio to broadcast Public Service Announcements via the Alaska Public Radio Network (with 85,000 listeners weekly), encouraging Alaskans to promote the Clean Energy Agenda; also, on Earth Day itself, running a half-page ad on climate change and its effect on the Alaska’s environment
- Community outreach, nationwide: Through the WWF Education program, we are bringing images and voices of the Bering Sea to the general public of the United States. Margaret Williams, the Bering Sea Ecoregion leader, has appeared with Aquilina Bourdukofsky (of St Paul Island) at the Smithsonian’s National Zoo and Seattle’s Woodland Park Zoo to give slide show presentations about the special traits of the Ecoregion. WWF has developed a partnership with the Alaska SeaLife Center, where we are jointly hosting a Steller Sea Lion Day in May 2000 and planning other educational activities.

#### **2.5.6**

##### **Providing Technical Support to Russian Protected Areas**

- In addition to supporting activities in Kommandorsky, Karaginsky, and Nalychevo areas, we are providing some support to Wrangel Island Nature Reserve. This Arctic outpost is a critical area for protecting the Bering Sea’s polar bears, walrus, and many migratory birds. Our biodiversity assessment identified the Wrangel Island and its surrounding waters as a high priority for conservation. After helping to publish a color brochure of the Wrangel Island federally protected nature reserve, through our Russia Program Office, we have submitted a proposal to UNESCO to grant the Wrangel Island reserve status as a World Heritage site. A decision is pending.

**TABLE OF PROGRESS IN MEETING KEY ACTIVITY BENCHMARKS**

<b>Benchmark Number</b>	<b>Benchmark/Output</b>	<b>Status*</b>
2.1	Formal establishment of marine zone, initiation of environmental enforcement and educational activities.	On-Track
2.2	Documentation of marine resources most valued by local indigenous peoples; basic documentation of location of resource use activities by local people; by non-local, commercial-scale users; potential concepts of marine protected area in Karaginsky Bay.	On-Track
2.3	Population estimate of sea otters, a potential indicator species, in one of WWF's priority areas within the Bering Sea Ecoregion.	On-Track
2.4	Increased awareness of target audiences on the biological and economic importance of the Bering Sea.	On-Track
2.5	Increased international attention to loss of economic resources and biological wealth in the western Bering Sea due to illegal fishing. Increased pressure on governmental bodies to work together to resolve problem of over fishing and mismanagement of fisheries in the Bering Sea.	On-Track

\* Status may include activities that are completed, on-track, delayed, mixed performance, or cancelled.

## **SOUTHWESTERN AMAZON ECOREGION**

### **OBJECTIVES**

The objective of the Southwest Amazon Program is to conserve the full extent of the biodiversity of the ecoregion by protecting key sites and wildlife populations. This will be done by developing and consolidating an Ecological Conservation Corridor (Amboró-Madidi), and upgrading the status and protection of the Many Reserve Zone.



### **COLLABORATORS/PARTNERS**

- WWF-Bolivia
- USAID-Bolivia
- Fundación Amigos de la Naturaleza – FAN
- Servicio Nacional de Areas Protegidas – SERNAP
- Herencia
- Universidad Amazónica del Pando

### **SUMMARY**

During this period two major activities were initiated

A contract was signed between WWF and Fundación Amigos de la Naturaleza (FAN) to study the biodiversity of the Corridor area and design and establish a baseline and monitoring and evaluation system to aid in the development and monitoring of the Corridor. FAN has hired two experts, one in the design of monitoring and evaluation systems and the other in information management. A second draft of the monitoring and evaluation system was completed and biological and socio-economic information had begun to be gathered.

On June 1<sup>st</sup> a contract with the Servicio Nacional de Areas Protegidas (SERNAP) will be signed to support a Coordinator for the Corridor Project who will be hired by SERNAP to coordinate the Project. The Coordinator's major responsibility will be to establish the Ecological Corridor Working Group (ECWG) which will be the representative group of actors and stakeholders who will participate in the development and establishment of the Corridor.

#### *Highlights:*

- WWF and SERNAP have selected the Coordinator for the Ecological Corridor who will

- begin on June 1<sup>st</sup>.
- Received from FAN a second draft of the design for the monitoring and evaluation system of the Corridor.
- Infrastructure and land tenure maps for the Corridor have been prepared by FAN.

## **ACTIVITY DESCRIPTION**

### **3.1 CONSOLIDATION OF AN ECOLOGICAL CONSERVATION CORRIDOR (AMBORO-MADIDI)**

#### **3.1.1**

#### **SWA coordinator (WWF) and SERNAP advisor coordinate and facilitate the initiation of a collaborative structure for defining and managing the corridor**

The Coordinator has been selected and will begin working with SERNAP in June.

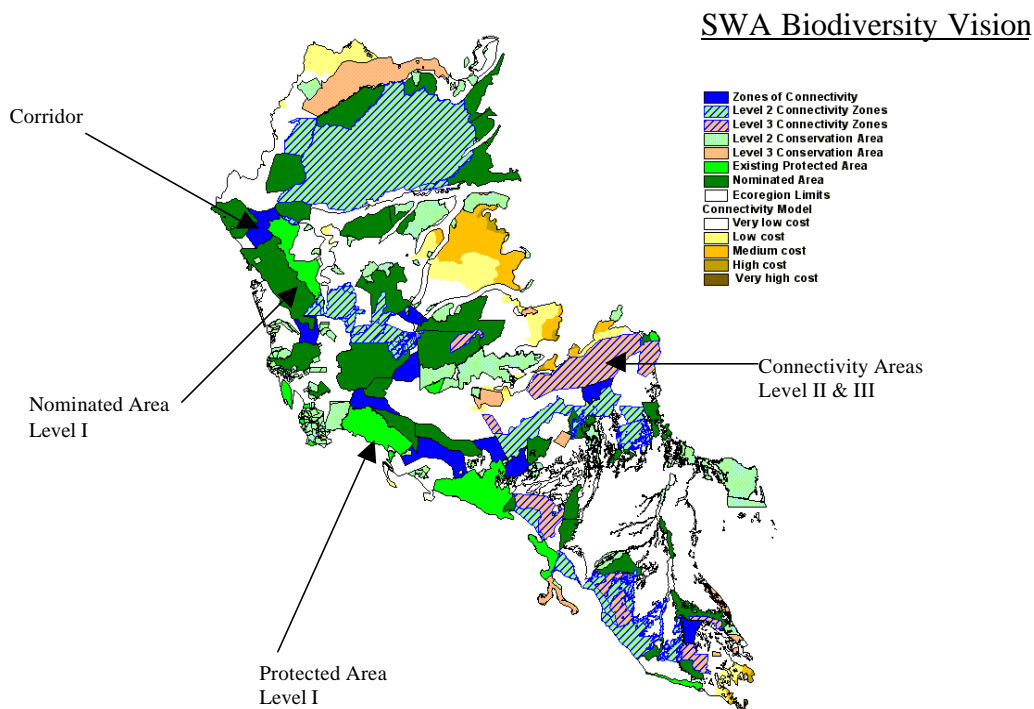
The Coordinator position was advertised twice. The first time none of the applicants were qualified. The second time three candidates were interviewed and an excellent candidate was offered the position. The Coordinator is a biologist with significant experience in the area working with many of the major actors.

#### **3.1.2**

#### **Gather information (field-based and from databases) to establish a complete and updated biological and sociological database for the corridor**

Working with the original biological and socio-economic assessment that was done by FAN last year the database was reorganized and restructured to serve as a basis for developing the Corridor database. A reconnaissance trip was made to the area to help define points for collecting additional biological and socio-economic data. New maps were developed including – base map, extent of biological information (flora and fauna) map, state of conservation map, protected areas map, and provincial and administrative divisions map. In order to conduct field studies, a methodology and a questionnaire were designed.

FAN discovered that IGM maps were needed to do their work and funds were not available in the initial budget. Additional funds were requested from WWF-US and maps are now being ordered.



### 3.1.3

#### **Conduct analysis of biological and socio-economic data. Design the Biodiversity Monitoring and Evaluation System**

Information has not been gathered. However, collection points have been identified and methodology and questionnaires defined. The second draft has been completed of the monitoring and evaluation system and is being reviewed. Political, social and biological indicators have been defined and basic parameters defined for their application.

Evaluation and analysis of the information has not been done yet. The FAN Team has just left on a month long trip to collect data. Heavy rains during the rainy season hindered traveling sooner. The new Coordinator will be collecting additional data when he begins in June. The ECWG will participate in the analysis and evaluation of the data when it has been formed which is now programmed for June.

### 3.1.4

#### **Initiate development of Ecological Corridor Conservation Plan and Biodiversity Monitoring and Evaluation System**

As mentioned above the baseline and monitoring and evaluation system is being designed. After the baseline has been completed and the Corridor vision defined, the Conservation Plan will then be developed. We estimate that this will be done in the third year.

### 3.1.5

#### **Initiate development of Biodiversity Monitoring and Evaluation System with the ECWG**

Once the ECWG has been formed members will be asked to improve on the monitoring and evaluation system draft. Key indicators and processes will be agreed on and methodologies and information will be taken into consideration in finalizing the Corridor system.

**TABLE OF PROGRESS IN MEETING KEY ACTIVITY BENCHMARKS**

<b>Benchmark Number</b>	<b>Benchmark/Output</b>	<b>Status*</b>
3.1.1	Ecological Corridor Working Group (ECWG) organized. Roles and responsibilities identified among the group.	Delayed
3.1.2	a. Field-based biological and ecological assessments completed to inform conservation decisions b. Integration of data from established monitoring systems c. Formation of conservation database	On-Track On-Track On-Track
3.1.3	a. Ecological zoning and protection plan designed for the corridor, including maps of biological (species distributions, habitat and landscape characteristics, indicators) and socioeconomic (threats, focal activities) components (FAN) b. Evaluation of current status of biodiversity conservation (gap analysis), habitat representation, viability of protected areas – FAN/ECWG) c. Analysis of existing management plans and control of protected areas (SERNAP) d. Design Biodiversity Monitoring and Evaluation System	Delayed Delayed Delayed On-Track
3.1.4	Analysis performed to develop Conservation Plan and Monitoring and Evaluation System	Delayed
3.1.5	Steps made toward developing plan for community-based monitoring of threats and indicators (communities informed, indicators identified, education process begun)	Delayed

\* Status may include activities that are completed, on-track, delayed, mixed performance, or cancelled.

## **ATLANTIC FOREST ECOREGION**

### **OBJECTIVES**

The purpose of this five year project is to make significant advances toward the long-term goal of conserving the full extent of the globally significant biodiversity of the Atlantic Forest Terrestrial Ecoregion Complex and the Upper Paraná River freshwater Ecoregion of Brazil, Argentina, and Paraguay.



Iguazú Falls, Argentina/Brazil

by Doreen Robinson

### **COLLABORATORS/PARTNERS**

- WWF-Brazil
- Fundación Vida Silvestre Argentina (FVSA)
- USAID-Paraguay

Selected Partners Paraguay:

- Fundación Moises Bertoni
- Carrera de Ingeniería Forestal de la Universidad Nacional de Asunción
- Dirección de Ordenamiento Ambiental y Centro de Datos para la Conservación, Dirección de Parques Nacionales y Vida Silvestre - Subsecretaría de Estado de Recursos Naturales y Medio Ambiente, both of the Ministerio de Agricultura y Ganadería
- AlterVida
- Guyra Paraguay
- Servicios Ecoforestales para Agricultores - SEPA
- Sobrevivencia
- Instituto de Derecho Ambiental - IDEA
- ITAIPU- Paraguay
- Peace Corps Environment-Paraguay

### **SUMMARY**

WWF's activities for the Atlantic Forest Ecoregion Complex are directed toward four long-term goals: mobilizing conservation action on an Ecoregional scale; protection of key sites and wildlife populations; shaping regional development to support conservation; and establishing the long-term conditions and capacities needed to sustain conservation. This report focuses on actions for Paraguay which are those directly supported with USAID funds (indicated with "\*\*\*\*"). The report also includes progress on some relevant actions in Brazil

and Argentina, which are supported by matching funds.

*Highlights:*

- To produce the first tri-national map of remaining forest cover of the Atlantic Forest Ecoregion Complex, the 1997 map of Atlantic Forest cover was ground-truthed and analysis completed to permit its integration with maps of Argentina and Brazil. The Fundación Moises Bertoni, the Carrera de Ingeniería Forestal and the Sub-secretariat for the Environment presented the Paraguayan map to the Paraguayan conservation community in February 2000 at an event celebrating inter-institutional collaboration. The Paraguayan National Senate has invited the National Commission to present the map to the Senate in the near future.
- Lucy Aquino was selected as the WWF Atlantic Forest Coordinator for Paraguay. She began working April 5, and will soon have her office base functioning in Asunción.
- WWF integrated biological and socio-economic data collected by experts in Paraguay, Argentina, and Brazil to form an integrated data base for analysis and developing a Biological Vision to guide long-term actions for the conservation of the Biodiversity of the Interior Atlantic Forest Ecoregion.
- WWF convened 34 experts from Brazil, Argentina, and Paraguay in a Tri-National workshop to develop a Biological Vision for the Interior Atlantic Forest. Participants completed a preliminary ideal landscape design (with priority areas, size and configuration determined) to define successful conservation of the Biodiversity of the Ecoregion. They also identified principal threats and opportunities for conservation and developed recommendations for immediate action. Final documents will be completed by June 2000.
- Participants in the Biological Vision workshop discovered the value of integrating the best available multidisciplinary and multinational data and teams to guide the determination of long-term goals to assure the conservation of Biodiversity and prioritize action.
- The Paraguay National Commission will use the Biological Vision that is developed to evaluate the potential impact of the 1999 National and Tri-National action plans on the Biodiversity of the Interior Atlantic Forest Ecoregion. They will revise the plans and corresponding fundraising proposals completed as needed to mobilize priority actions needed immediately.

## **ACTIVITY DESCRIPTION**

### **4.1 MOBILIZE CONSERVATION ACTION ON AN ECOREGIONAL SCALE**

**4.1.1****Establish the institutional relationships and develop a mechanism for coordination of Atlantic Forest activities in Paraguay and Paraguayan participation in Ecoregion-wide activities. \*\*\***

- a. Lou Ann Dietz (WWF-US Senior Program Officer for the Atlantic Forest Ecoregion) traveled in February 2000 to Asunción where she organized a selection process for the new Atlantic Forest coordinator position. She met with many organizations to collect information on office costs, Paraguayan employment practices and cost of benefits as well as references for legal consultation. We decided to contract the coordinator as a consultant, and the Instituto de Derecho Ambiental reviewed the contract and confirmed that all was legal in terms of Paraguayan law (see attached job description).
- b. We decided to rent a small independent office in Asunción for the coordinator rather than to rent a space from another organization as we originally planned. We felt this independence would help promote developing healthy relationships with all stakeholders, rather than giving the impression of any exclusive relationship with any one organization.
- c. We posted the WWF Atlantic Forest coordinator position for Paraguay in February, and conducted interviews in March. Aida Luz Aquino, better known as Lucy Aquino, was selected from a pool of 25 Paraguayan candidates. With ten years of experience as the Scientific Authority for Paraguay for CITES, twenty years of field research and teaching with the National Museum of Natural History of Paraguay and the National University of Asunción (see attached CV), Lucy is a well-respected member of the Paraguayan scientific and conservation communities. Her experience inside government, academic, and non-governmental agencies as well as considerable teaching and field research experience make her uniquely qualified to mobilize and increase the capacity of Paraguayan institutions and individuals to participate in Atlantic Forest Ecoregion-based conservation. Lucy's contract with WWF began April 1, and she is now establishing an office base in Asunción and working (with Luis Paulo Ferraz in WWF-Brasil, Guillermo Placci in FVSA/Misiones and Lou Ann Dietz in WWF-US) as a fully integrated member of the WWF Atlantic Forest team.
- d. As an orientation, Lucy participated in WWF workshops on forest certification in Argentina in March and in the Biological Vision Workshop held in Foz do Iguaçu in April. She participated in team discussions the first week in May to begin revisions of our integrated FY2001 work plan for the Ecoregion.
- e. Lucy and Lou Ann Dietz have begun a series of meetings with each of the current Paraguayan partners to clarify WWF's role as one of supporting the development of Paraguayan leadership and coordination for Atlantic Forest conservation, rather than being the leader. We have begun to discuss with each organization its strengths and goals as well as its needs for capacity building, all of which will help to develop a

strategy for increasing the capacity of the overall Atlantic Forest conservation movement. WWF has already identified some training needs: sustainable forest certification and economic approaches to analyze threats to biodiversity. WWF Conservation Economics Unit staff is scheduled to offer August 7-11, in Foz do Iguaçu, a 5-day course for non-economist WWF staff and Ecoregion partners to become familiar with economic issues and instruments as they relate to conservation. WWF is also supporting Victor Vera to receive training in forest certification in Europe and South Africa. He will offer a workshop on certification in Paraguay after his return.

- f. WWF supported participation of representatives of eight Paraguayan institutions in the Tri-national Biological Vision workshop held April 24-26 in Foz do Iguaçu. In addition to contributing towards identifying long-term goals for Biodiversity conservation, participants received training in the methodology of Ecoregion-based conservation and strengthened the integration of data to support improved planning and monitoring of work across country borders at an Ecoregion level. (See appendix C for workshop report and maps).



Workshop participants

by Doreen Robinson

#### 4.1.2

##### **Internal organization and action plan for Tri-national Forest Corridor network established and implementation begun. \*\*\***

- a. The three National Commissions of the Tri-National Initiative for the Conservation of the Green Corridor were all organized with the specific purpose of assuring the implementation of the tri-national action plan that was developed at the August 1999 meeting of the Tri-national Initiative. All the commissions are progressing in establishing functional structures and consolidating the membership of all the sectors involved. In Argentina, the National Commission is actually serving as a mechanism to assure continuity of efforts to implement the Green Corridor Law passed in December 1999, at the end of the mandate of the last Misiones provincial government. The fact that the National Commission includes all sectors has been an incentive for the new provincial Ministry of Ecology to participate. The National

Commission has begun reviewing the proposed regulations for the law, which include lowering the tax on properties in the Corridor and a greater return of provincial value added tax to municipalities in the corridor.

In Paraguay, the National Commission now has additional representatives of the production and law enforcement sectors, as well as the hydroelectric dam of Itaipú. A problem has been to maintain continuity of government participation with the frequent turnover of environment sub-secretaries and directors. The Commission members are actively working to involve each new government administration and the legislative sector as well. The Commission is truly serving as an integrating body to coordinate all actions related to the Atlantic Forest in Paraguay. They are actively working to formally define a functional structure and develop a proposal to seek minimal funding to support the logistics of their meetings. The Paraguay National Commission consists of:

- Fundación Moises Bertoni (representative of the Paraguay National Commission in the Tri-National Commission) - representing environmental NGO's
- Sobrevivencia - representing social NGO's
- DPNUS/SSERMA - representing government agencies
- Instituto de Derecho Ambiental - representing legal sector and law enforcement
- Asociación Rural del Paraguay - representing the production sector
- Vacant position - representing other production sectors
- Itaipú - Paraguay - hydroelectric sector
- Carrera de Ingenieria Forestal - scientific sector

The role of the WWF Coordinator will be to strengthen the capacity of the Commission, not to coordinate it. The National Commission coordinated the Paraguayan participation in the Biological Vision workshop. The participants see the resulting vision as a basis for evaluating and adjusting the Tri-national action plan to increase the impact on biodiversity.

- b. The Tri-national Commission is supporting the National Commissions to complete their organization before their next meeting in June 2000.

#### **4.1.3**

#### **Atlantic Forest network organizations strengthened and integrated with WWF strategies**

Activities during this period focused on involving more sectors in the Paraguay National Commission and in involving groups in the biological vision process.

#### 4.1.4

#### **Complete Biological Vision for the Interior Atlantic Forest and Araucaria ecoregions (these ecoregions cross the borders of the three countries):**

- a. Atlantic Forest portion of Paraguay 1997 forest cover map ground truthed and revised for key areas using the same methodology as Brazil and Argentina - completed (using matching funds) - see attached map
- b. Integration of Argentina and Paraguay forest cover maps into PROBIO maps for Brazil to produce forest cover maps for the entire Araucaria and Interior Atlantic Forest ecoregions -completed
- c. Ideal landscape designed (with priority areas selected, size and configuration) and principal threats identified with participation of experts in a Biological Vision workshop. (see attached Biological Vision workshop report and map)

### **4.2 PROTECT KEY SITES AND WILDLIFE POPULATIONS**

#### 4.2.1

#### **Policy framework established for improved protection and management of existing protected areas**

FVSA has completed a scorecard evaluation of all protected areas in the Green Corridor of Misiones province, Argentina. Results will be prepared for dissemination during the next period.

#### 4.2.2

#### **Continued implementation of integrated conservation and development projects to protect 3 key sites: Poço das Antas; Una; and the Misiones Tri-National Forest Corridor**

- a. **Poço das Antas region (Rio de Janeiro, Brazil, coastal forest) forest fragments supporting a minimum viable population of golden lion tamarins**
  - With funding from WWF-UK/WWF-Brazil, our local partner The Golden Lion Tamarin Association (GLTA) has begun work with the director of the União Reserve to identify resources, which will contribute to a management plan for the União Reserve. The Association has begun leading an effort to develop a landscape design for connecting all the remaining forest fragments of 50 hectares or more to secure the conservation of biodiversity in the sub-Ecoregion. At the same time they are mobilizing local stakeholder support and trying to identify financial resources to implement the plan. The União Reserve and the Poço das Antas Reserve are the most important anchor areas in this design, and the directors are actively participating in these discussions. An Inter-municipal Consortium for this region has already been created as a non-governmental

organization to conduct regional planning and receive state and municipal government and corporate funds for implementation. The members include the mayors of 12 municipalities, eight corporations, and four regional NGO's (including the GLTA). The Association included the landscape design on the agenda for a Consortium workshop in March 2000 to develop an integrated management plan for the São João River Basin.

- The Golden Lion Tamarin Association is working with researchers of the Botanical Garden of Rio de Janeiro to design the corridors to be implemented in the Poço das Antas Reserve. Constant vigilance to prevent fires continues. The GLTA is also conducting a diagnostic of five land settlements recently created by the Brazilian Land Reform Agency (INCRA) in farms surrounding the Poço das Antas Reserve. They are conducting training courses in agro-forestry and handicrafts and teacher training for these communities with the objective of reducing their impact on the Reserve. In November, INCRA donated a neighboring 800-hectare area of lake and island to the Poço das Antas Reserve, thus raising its total area to 6,300ha.
- The GLTA continues intensive work with local landowners to connect private land fragments through planted corridors of mixed native species and species such as coffee and coconut which will bring some economic return to the owners. Two areas serve as demonstration corridors, and interest is increasing. The GLTA hopes to expand this work through the regional planning effort.
- No new areas have been legally protected this year, but the GLTA is actively promoting the establishment of private reserves in the region.
- The GLTA conducted an assessment of information needs for monitoring and adaptive management of a viable population of golden lion tamarins. They analyzed impediments to information flow and resolved them. A four-year backlog of data was computerized so that, with the new systems in place, information from field research on the lion tamarins is now immediately available for monitoring and guiding management decisions.
- The Biodiversity Secretary of the Brazilian Ministry of the Environment has agreed to endorse a landscape design as official policy of the Ministry.

**b. Minimum viable contiguous forest conserved to assure conservation of a viable population of golden-headed lion tamarins - Una region (Southern Bahia state, coastal forest, Brazil)**

- Funds (from WWF-I) are finally available to WWF-Brazil to leverage Brazilian government matching funds to compensate remaining squatters in the Una Reserve. All are interested in leaving. It is hoped to resolve this question before the end of the fiscal year.

- A model for sustainable land use in land-settlement communities has been developed in two land settlement communities surrounding Una. These experiences are currently being documented for wider dissemination. This includes a methodology for monitoring changes in forest cover on these properties.

**c. Misiones Tri-National Green Corridor recognized and made viable**

FVSA has completed legal demarcation of the Urugua-í Reserve limits, construction of an access road and gate to the reserve. Completion of construction of a multi-purpose building will allow the reserve director to live on site, providing a permanent presence to monitor actions of the neighboring timber company and assist in protection of the neighboring Urugua-í Provincial Reserve.

In collaboration with the Provincial Environment Ministry the FVSA/WWF campaign to generate support for the provincial Green Corridor bill resulted in its passage on December 8, 1999. WWF-US recognized the passage in an ad in the Washington Post on December 15. The law guarantees the continuity of the one million-hectare forest corridor connecting with protected areas in Brazil and Paraguay, and includes parks and reserves as well as private forest in Argentina. Our efforts in Argentina for the next few years will focus on ensuring the availability to the provincial and municipal governments of technical and financial resources to effectively administer the law. The legal establishment and implementation of the Green Corridor will be celebrated as a Gift to the Earth by the WWF network at the Hanover Exposition in FY01.

The Argentina National Commission of the Tri-national Initiative is reviewing the proposed regulations for implementing the Green Corridor Law.

The biological vision that is under development for the Paraná/Paraíba Interior Atlantic Forest will provide key input to develop the zoning for implementation of the Green Corridor Law.

#### **4.2.3**

##### **New protected areas created and implemented**

**a. Priorities established for creation of new protected areas**

WWF-Brazil has completed a gap analysis of Ecoregions represented in federal protected areas in the Brazilian portion of the Global 200 Atlantic Forest Ecoregion Complex. WWF-Brazil will complete the gap analysis of state protected areas by June 2000. Other types of analyses are being conducted as a part of the process to produce a Biodiversity Vision.

**b. Threats to integrity of Ecoregion assessed and prioritized**

This is being conducted as a part of process to reach a Biodiversity Vision.

**c. Integrated tri-national Geographic Information System (GIS) map/database established for the Ecoregion**

The Brazilian government-sponsored PROBIO workshop of experts, held in August 1999 to set priorities for the conservation of the biodiversity of the Atlantic Forest in Brazil, compiled a large amount of information that was analyzed by Ecoregion. This information has been made available to the WWF Atlantic Forest team to incorporate into the process to define our biological visions for each of the 12 ecoregions in the Atlantic Forest Global 200 complex. This part of the work is coordinated by WWF-Brazil with FVSA coordinating data collection from Argentina and Paraguay. This assessment produced the first ever map of the current forest cover for the entire Ecoregion complex in all three countries. Work is going forward to complete (with partners in Brazil, Argentina, and Paraguay), by the end of April 2000, a finer scale vision - landscape design, for two priority areas:

- The Tri-national Green Corridor in the Paraná/Paraíba Interior Forests Ecoregion and,
- The remaining forest fragments in the Pernambuco coastal forests and Pernambuco interior forest ecoregions.

**4.3 SHAPE REGIONAL DEVELOPMENT TO SUPPORT CONSERVATION****4.3.1****Limit unsustainable use of the forest**

Forest certification appears to be one of the most concrete alternatives for the development of economic activities compatible with conservation of the biodiversity in the Green Corridor of Misiones, where the largest proportion of lands are privately owned. Since there is no certification in Argentina using the criteria of the Forest Stewardship Council (FSC), FVSA organized, together with the Ministry of Ecology, a very successful informational meeting in March 2000 to explain certification. Over 50 large landowners and timber companies in Misiones and neighboring provinces attended presentations by the representative of the FSC for Latin America, certifier companies, and a representative of the Yaguarete Forest Company in Paraguay. The Yaguarete Forest Company has the only experience with native timber certification in the Atlantic Forest. Follow-up activities will be planned shortly to develop the clear interest generated by the meeting.

**a. No unsustainable logging practices - commercial Atlantic Forest products operations certified**

No activities during this reporting period

**b. Logging moratorium in Brazil**

No activities during this reporting period

**4.3.2**

**Promote alternative sustainable use of the forest in Misiones province, Argentina**

**a. Results of sustainable use pilot projects disseminated**

The results of five pilot projects in Misiones, Argentina were presented at the Tri-National Initiative Workshop in August 1999. WWF/FVSA decided to invest further FY00 funds in the continuation of a project to develop and disseminate methods to prevent jaguar predation on livestock in the Green Corridor area. Significant additional funds must be raised to establish a permanent funding mechanism to encourage additional pilot projects in Misiones.

A pilot project experimenting with electric fences to prevent jaguar predation on pigs in small farms on the edge of Iguazú National Park is now being expanded to replicate the experiment in other areas and begin dissemination in the region.

**4.3.3**

**Establish a land use policy framework that supports conservation**

**a. Controls on logging strengthened and enforced; ban on deforestation in Brazil maintained and enforced; a broad legal definition of Atlantic Forest ensured**

For the first time the agencies responsible for environmental law enforcement in the three countries were invited to jointly participate in the August workshop of the Tri-national Initiative. Representatives of the Gendarmería Nacional of Argentina as well as forest police from the states of Paraná, Santa Catarina, São Paulo, and Mato Grosso do Sul in Brazil attended and formed a working group and action plan for coordinating law enforcement efforts across national borders. Representatives of the law enforcement sector are being appointed to the National Commissions in each of the three countries.

In December, WWF-Brazil led national campaign efforts of a Brazilian Atlantic Forest coalition to thwart an unexpected attempt, by a pro-agriculture block in the Brazilian Congress, to bring a proposal for greatly reducing the Brazilian Forest Code requirements for protection of forest on private land. In less than a week, the campaign gained the support of 180 Brazilian organizations and succeeded in a postponement of the vote until April to allow ample discussion.

Atlantic Forest Coalition efforts dating back 10 years to advocate passage of a Brazilian federal law prohibiting deforestation in the Atlantic Forest region resulted in a revised bill passed in congressional committee on December 15, 1999. WWF-Brazil is working with the Atlantic Forest coalition to promote final passage of this law.

**b. Land reform policy compatible with protection of the forest; landless people's invasions focused on non-forested areas**

In May 1999, WWF-Brazil and partner organization Jupará, together with the Federal University of Bahia held a seminar "Agrarian Reform and Conservation". The results of this seminar should be incorporated into a case study of the agrarian reform settlement project in the buffer zone of the Una Reserve, to be disseminated through a national seminar of Atlantic Forest experiences.

As her master's thesis, Katia Costa, former Atlantic Forest coordinator of WWF-Brazil, evaluated the contribution to conservation of Atlantic Forest of the management plans of the land settlement communities in the Una region. The evaluation, completed in February 2000, is based on a time series of satellite images looking at forest cover in the region. If it is determined that these management plans do indeed contribute to Atlantic Forest conservation, WWF could work to influence the land reform agency INCRA to include these forest management plans as essential elements of planning land settlements.

**c. Feasible economic incentives for protection of Atlantic Forest identified**

The Brazilian Federal Environment Agency IBAMA completed a study of economic incentives for private reserves. This study determined that a reduction of property taxes was not a significant incentive for the establishment of private reserves (RPPN's) in Brazil. Landowners who have established private reserves cited assistance in actual protection (such as prevention of hunting) of the areas, as a much more important incentives. WWF-Brasil is now disseminating a brochure it produced to promote the establishment of RPPN's.

#### **4.4 ESTABLISH LONG-TERM CONDITIONS AND CAPACITIES NEEDED TO SUSTAIN CONSERVATION**

##### **4.4.1**

##### **Public awareness of the value of the Atlantic Forest increased**

In addition to serving as a base map for planning, the Ecoregional forest cover map completed in April 1999, will also be disseminated to the public to raise awareness of the critical status of the ecoregions. The public launch is postponed until FY2001. The Paraguay portion was presented to the Paraguayan conservation community in February

2000, and the Paraguay National Commission for the Interior Atlantic Forest (BAI) has been invited to present the map to the Paraguayan Congress later this year.

The expertise to develop analyses of the economic value of protected Atlantic Forest is not readily available in the Ecoregion or on the Ecoregion team. As mentioned earlier, the WWF Conservation Economics Unit has agreed to offer a five-day training workshop in August 2000 for the Atlantic Forest Ecoregion team and partners. In the training they will develop a sufficient competency in the subject to develop terms of reference for consultants to conduct this type of research.

WWF-Brazil has produced video and photographic material as a part of its National Parks campaign, which can be used separately for Atlantic Forest work. They intend to provide support to the campaigns planned by the Rede Mata Atlântica NGO network in Brazil. In addition, FVSA intends to disseminate its scorecard of protected areas in Argentina. WWF intends to develop a dissemination strategy for the Biological Vision as soon as the scientific basis is documented.

**a. Value of ecological services of protected forest disseminated to the general public and decision makers**

The Paraguay National Commission for the Interior Atlantic Forest (BAI) has been invited to present the Atlantic Forest cover map to the Paraguayan Congress later this year. It is hoped that this opportunity can be used to raise awareness of Paraguayan decision-makers of the importance of the forest.

#### **4.4.2**

#### **Funding mechanisms developed to provide sustained funding for Atlantic Forest Conservation**

**a. Proposals developed to the GEF from each of the three countries**

An Argentine draft suitable for a proposal to GEF is complete. An outline is complete for Paraguay. The Tri-National Initiative National Commissions of both countries are evaluating and revising their proposals in light of their impact on achieving the preliminary landscape design developed and addressing threats identified in the Biological Vision workshop held in April for the Paraná/Paraíba Interior Atlantic Forest Ecoregion. Since the Brazilian government is giving priority to a GEF proposal for protecting 10% of the Brazilian Amazon Forest, WWF-Brazil will not develop a GEF proposal for the Atlantic Forest. Other sources of funding will need to be identified for Brazil.

The WWF Atlantic Forest team coordinated preparation of a proposal concept for a \$3 million bi-national project to address threats to the Iguazu/Iguazú National Parks, both World Heritage Sites. Partners in the proposed project include WWF-Brazil,

FVSA, Iguazú National Park [APN] - Argentina, Iguazu National Park [IBAMA]-Brazil, Misiones Provincial Ministry of Ecology, UNESCO-Brazil, and UNESCO-Argentina. The Brazilian National Park was declared a World Heritage Site in Peril in December 1999 because of local pressure to open a road dividing the Park, the last large remnant of Interior Atlantic Forest in Brazil, in two parts. These parks and buffer zones make up a significant core portion of the *Green Corridor* legally protected by the new law in Argentina, and were identified in the April Biological Vision workshop as a priority area of the Paraná/Paraíba Interior Atlantic Forest Ecoregion. In response to a call for proposals, UNESCO-Brazil submitted the proposal concept to the United Nations Foundation on March 1, 2000. Unfortunately the UN Foundation did not request a full proposal due to previous commitments to fund a more general proposal submitted by the Brazilian Environment Ministry. We are now searching for other funders who might consider the proposal.

**TABLE OF PROGRESS IN MEETING KEY ACTIVITY BENCHMARKS**

<b>Benchmark Number</b>	<b>Benchmark/Output</b>	<b>Status*</b>
4.1.1	WWF Ecoregional Team capacity established to coordinate mobilization of conservation action for the Atlantic Forest.	On-Track
4.1.2 & 4.1.3	A network of institutions with a shared vision for the Ecoregion developed	On-Track
4.1.4	Biological vision for the Atlantic Forest	On-Track
4.2.1	Policy framework established for improved protection and management of existing protected areas.	On-Track
4.2.2	Continued implementation of integrated conservation and development projects to protect three key sites: Poço das Antas; Una; and the Misiones Tri-National Forest Corridor. a. Poço das Antas forest fragments supporting a minimum viable population of golden lion tamarins region (Rio de Janeiro, Brazil, coastal forest). b. Minimum viable contiguous forest conserved to assure conservation of a viable population of golden-headed lion tamarins – Una region (Southern Bahia, coastal forest, Brazil). c. Misiones Tri-National Green Corridor recognized and made viable.	On-Track On-Track On-Track On-Track
4.2.3	New protected areas created and implemented a. Priorities established for creation of new protected areas. b. Threats to integrity of Ecoregion assessed and prioritized c. Integrated Tri-national Geographic Information System (GIS) map/database established for the Ecoregion.	On-Track On-Track On-Track On-Track

4.3.1	Limit unsustainable use of the forest a. No unsustainable logging practices – commercial Atlantic Forest products operations certified. b. Logging moratorium in Brazil.	On-Track Cancelled
4.3.2	Promote alternative sustainable use of the forest in Misiones province, Argentina. a. Results of sustainable use pilot projects disseminated.	First Phase Completed
4.3.3	Establish a land use policy framework that supports conservation. a. Controls on logging strengthened and enforced; ban on deforestation in Brazil maintained and enforced; a broad legal definition of Atlantic Forest ensured. b. Land reform policy compatible with protection of the forest; landless people's invasions focused on non-forested areas. c. Feasible economic incentives for protection of the Atlantic Forest identified.	On-Track On-Track On-Track On-Track
4.4.1	Public awareness of the value of the Atlantic Forest increased. a. Value of ecological services of protected forest disseminated to the general public and decision-makers.	Delayed
4.4.2	Funding mechanisms developed to provide sustained funding for the Atlantic Forest Conservation	On-Track

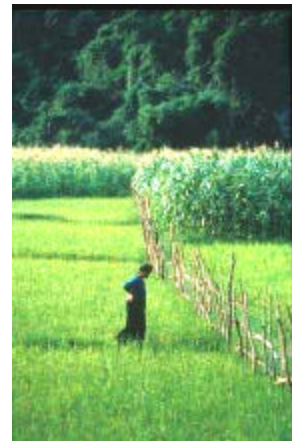
\* Status may include activities that are completed, on-track, delayed, mixed performance, or cancelled.

## **FORESTS OF THE LOWER MEKONG ECOREGION**

### **OBJECTIVES**

To ensure the conservation and sustainable use of Biodiversity and maintain the integrity of biological processes across the Forest of the Lower Mekong.

The goal for this initiative is to provide appropriate technical assistance for Combating Illegal Wildlife Trade in Lao PDR and Neighboring Countries.



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### **COLLABORATORS/PARTNERS**

- Department of Forestry, Lao PDR and other relevant Government Ministries and Departments,
- Traffic SE Asia, WCS Lao PDR

### **SUMMARY**

Unfortunately the project has not yet received Lao Government approval so far, so it can not get started. This is being followed up on a regular basis with our government counterparts in the Department of Forests and our information is that it will start in the near future. Therefore there are no real activities, staff movements or expenditures to report on.

We have just heard during a recent visit to appoint the new WWF Lao Conservation Manager (formerly coordinator) that this project is nearing approval stage within the government system. The Interview process was carried out with five representatives of the Department of Forestry and The Division of Forest Resource and Conservation, and three WWF Staff – The WWF Indochina Representative, Eric Coull, The WWF Cambodia Conservation Manager, Jack Hurd and Tran Tien Quang, the Indochina Program Office Operations Manager. This was a very useful exercise in relationship building as professional and social interaction took place over a few days.

### **ACTIVITY DESCRIPTION**

#### **5.1 PROVIDE SUPPORT AND GUIDANCE TO THE GOVERNMENT OF LAO PDR IN REGARD TO ITS ASCENSION TO CITIES**

##### **5.1.1**

**Production of awareness materials providing an overview of CITIES and its implementation**

No activities.

**5.1.2**

**Translation of relevant CITIES documentation into Lao language for use by decision-makers**

No activities.

**5.1.3**

**Conduct a national level workshop in cooperation with the Wildlife Conservation Society, IUCN, and Traffic Indochina**

No activities.

**5.1.4**

**Directed discussions with key decision-makers within the relevant line ministries**

No activities.

**5.2 INCREASE AWARENESS AND UNDERSTANDING OF THE EFFECT OF ILLEGAL WILDLIFE TRADE AT ALL LEVELS OF GOVERNMENT**

**5.2.1**

**Facilitate dialogue between the Ministry of Agriculture and Forestry of the Lao Government with the Ministry of Interior, and Ministry of Defense to specifically address the issue of Wildlife Trade**

No activities.

**5.2.2**

**Continued participation of WWF in the Lao National Working Group for Wildlife Regulations, in order to develop appropriate regulations for Wildlife and Wildlife Trade in cooperation with the Lao Government**

No activities.

**5.3 STRENGTHEN LAW ENFORCEMENT CAPACITY AT BORDER CROSSINGS**

## **AND OTHER FIELD SITES**

### **5.3.1**

#### **Improve training capacity at the level for Wildlife Trade enforcement**

No activities.

### **5.3.2**

#### **Improve the law enforcement capacity at eight border crossings between Lao, Vietnam, and Thailand**

No activities.

## **5.4 OTHER ACTIVITIES**

We have appointed Roland Eve as the Project Manager. He is a very experienced Conservation Manager and biologist who has worked very successfully for the past five years in Vietnam for two difficult Protected Area Management Projects: The Bach Ma National Park and Vu Quang Nature Reserve where the Sao la was discovered.

We have also just appointed a new national Office Manager to strengthen the administrative and financial control to the program and provide support for the Conservation Manager. Another role will be regular liaison with Government Counterparts and Departments, including following up on projects waiting for approval.

Traffic South East Asia has just recently produced a very useful and well-illustrated identification guide for the Region for use by Government officials and others interested in Wildlife Trade.

### **Ecoregional Biological Assessment Workshop**

Between 21-24 March 2000, a workshop entitled “*Ecoregion-based conservation in the Forests of the Lower Mekong – biological assessment workshop*” was held in Phnom Penh, Cambodia to develop a Biodiversity Vision for the “Region of Analysis”. The ERBC coordinator and the staff



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of WWF Cambodia organized the workshop. Biologists with extensive field experience in the region were invited to the workshop. More than 80 biologists, based both in the region and internationally, representing most of the organizations and institutions working on biological field research, participated in the workshop. The workshop was the first attempt to undertake a regional assessment of conservation priorities and therefore stands as a major landmark for conservation in the region. It was also the first time many of the scientists had collaborated on any such venture. Scientists came from Cambodia, Laos and Vietnam as well as from 15 other countries outside the region. In particular, five scientists came from Thailand to support the effort by providing details from their experience in related Ecoregions. For WWF Indochina, it was a fantastic opportunity to further their interest in cooperating at this level. It certainly was the largest and most ambitious meeting ever organized within the WWF Indochina program.

Although the name of the region of analysis is the *Forests of the Lower Mekong*, the assessment included all habitats, not just forests and included a team of freshwater scientists who undertook an assessment of freshwater priorities simultaneously with the terrestrial workshop. Held over four days, the workshop participants identified those landscapes they considered important for their own taxonomic interest such as mammals, vegetation, fish etc. They then re-organized into sub-regional groups, and using the landscapes they defined on the first day, identified the areas of overlap as the areas requiring priority attention. All the participants according to their global importance then ranked these areas. Throughout the workshop, the scientists also discussed the type and scale of threats to these landscapes and made attempts to measure the integrity of the habitats within each landscape.

Fifteen landscapes were identified as critical to global Biodiversity conservation. These included the mountains and lowlands known as the Annamites which occur mainly along the border between Lao and Vietnam. Other critical areas included the Tonle Sap Lake and flooded forests, the Cardamon Mountains, the dry forests of Cambodia, Vietnam and Lao and the wetland grasslands of the Mekong Delta. In addition to these priority sites, those areas requiring immediate further survey work were also identified and ranked.

The Workshop was characterized by the goodwill expressed between the scientists and the mammoth cooperative effort achieved in the four days. The results of this workshop are presently being compiled as the Biodiversity Vision for the *Forests of the Lower Mekong* and are expected to be published after July. In addition to this, the preliminary desk studies undertaken in preparation for the workshop will be published separately as a book. These studies are the first attempt to detail the ecological factors working within the region and the conservation priorities that require immediate attention.

### **Future Activities**

To follow the workshop, three national workshops will be held in the coming months to allow further scrutiny on a national basis, of the conclusions and to facilitate discussions on the implications of the workshop findings. After July, the ERBC process will be taken

through the next stages when the situational analysis will begin. Discussions of the scale and scope of this assessment have begun and will continue over the next few months. In the meantime, an ERBC unit for the *Forests of the Lower Mekong* will be set up in the WWF Indochina Program office, in Hanoi. This unit will be responsible for coordinating the process and disseminating the information collected as part of the process. The ERBC Unit will begin by identifying the individuals, institutions and organizations with a stakehold in Biodiversity conservation in the region to further ensure that the entire process is a truly collaborative effort and the process incorporates a comprehensive set of visions and strategies.

**TABLE OF PROGRESS IN MEETING KEY ACTIVITY BENCHMARKS**

<b>Benchmark Number</b>	<b>Benchmark/Output</b>	<b>Status*</b>
5.1	Improved understanding and support for CITIES and Wildlife Trade Law enforcement within all levels of Lao Government	Delayed
5.1.1	Two books produced and distributed to Government officials at Central and Field level in the Ministries of Agriculture and Forestry, Justice, Commerce, and Interior	Delayed
5.1.2	CITIES documentation available and distributed widely in the Lao language. Clear guidance produced for the Lao Government to follow in order to accede to CITIES	Delayed
5.1.3	National workshop held. Key decision-makers agree on a schedule for CITIES ascension and implementation	Delayed
5.1.4	High level of political support for Lao's ascension to CITIES	Delayed
5.2.1	Improved communication between relevant Ministries and Government Agencies <ul style="list-style-type: none"> <li>a. A minimum of four inter-ministerial meetings held to discuss conflicting policies and strategies for improved cooperation, specifically at international border crossings</li> </ul>	Delayed
5.2.2	Developed appropriate regulations for Wildlife and Wildlife Trade in cooperation with the Lao government <ul style="list-style-type: none"> <li>a. Regulations on Wildlife and Wildlife Trade drafted and ratified</li> </ul>	Delayed
5.3.1	Improved training capacity at the national level for Wildlife Trade enforcement <ul style="list-style-type: none"> <li>a. Training team assembled and conducting training. National level training capacity improved</li> <li>b. A curriculum produced and distributed in Lao language and English language and used after Lao government or other agencies complete the project</li> </ul>	Delayed

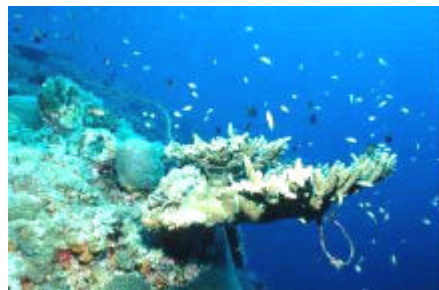
5.3.2	Improved law enforcement capacity at the eight border crossings between Lao, Vietnam, and Thailand <ul style="list-style-type: none"><li>a. Eight training's conducted at priority border sites between Laos, Vietnam and Thailand. Law enforcement capacities at these border crossings improved</li><li>b. Eight border crossings immediate equipment needs filled or an alternative source of support identified</li></ul>	Delayed
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\* Status may include activities that are completed, on-track, delayed, mixed performance, or cancelled.

## **THE SULU-SULAWESI MARINE ECOREGION**

### **OBJECTIVES**

The Objective of the SSME Program is to conserve the biological diversity and ecosystem process of the Sulu-Sulawesi Marine Ecoregion such that the natural biological character and ecology integrity of this system is maintained in the long-term.



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### **COLLABORATORS/PARTNERS**

- USAID
- The Marine Aquarium Council (MAC)
- The U.S. Department of Interior (DOI)
- The Tubbataha Protected Area Management Board
- The Philippine Department of Environment and Natural Resources
- Marine Conservation Society
- National NGOs in the Philippines, Indonesia, and Malaysia

### **SUMMARY**

In fiscal year 1999, with the support of USAID, WWF has made significant progress in the Sulu-Sulawesi Marine Ecoregion (SSME) conservation program. While administrative requirements prevented receipt of USAID funds until November of 1999, the commitment of these funds by the State Department and USAID enabled WWF to initiate activities earlier in 1999 and subsequently these activities are now paid for by the USAID support. The funds provided by USAID have helped enable WWF to secure co-financing from other donors including the Packard Foundation, the GEF, the Henry Foundation, and others. Additionally, under the USAID, WWF and the U.S. Department of Interior are partnering to provide important enforcement training for Marine Protected Area staff in the Philippines. This report detail's the progress we have made in Sulu-Sulawesi Marine Ecoregion conservation program with emphasis on activities supported by the USAID. The majority of the report focuses on progress and accomplishments; however, there is a section on challenges and lessons learned at the end of the report. A great deal has been learned in the past six months and there is much more to come.

#### *Highlights:*

- Expansion of the Sulu-Sulawesi Marine Enforcement Campaign both at core sites (Tubbataha and Anilao) and in new sites including Apo Reef and Cuyo Island;

- Deputation of stakeholder representatives as Fish Wardens and Fish Examiners in Tubbataha Reefs National Marine Park and Anilao Municipal Marine Reserve;
- Scaling up of patrol efforts at Tubbataha and Anilao to almost daily patrols;
- Apprehension of illegal fisherman at Tubbataha and Anilao and apprehension of a shipment of fish illegally caught with dynamite in Palawan;
- Collection of monitoring data at Tubbataha showing increased fish biomass over last year;
- Partnership with the dive industry to strengthen awareness and pursue dive tourism taxes as a sustainable financing mechanism;
- Execution of several educational workshops and training's as well as distribution of awareness materials in Palawan and Semporna Island;
- Visual observation of live coelacanth in Northern Sulawesi through an associated project;
- Completion of biological assessments in Northern Sulawesi and Eastern Kalimantan as part of the Ecoregion-based Conservation Process;
- Marine Aquarium Council (MAC) developing a strong network of support among Government, industry, and conservation organizations;
- MAC making significant progress in developing certification standards and understanding and designing a certification system.

In FY 2000, WWF hopes to build on these important accomplishments and with the assistance of the USAID expand our marine conservation efforts with a focus on the Eastern Indonesia Seas while continuing the important work in the Sulu-Sulawesi Seas.

## **ACTIVITY DESCRIPTION**

### **6.1 ENHANCING CONSERVATION ACTION AT CRITICAL SITES**

Under this objective, WWF is working to enhance conservation action at Tubbataha Reefs Marine National Park and Anilao Municipal Protected Area in the Philippines, Semporna Island National Park in Malaysia, and Bunaken National Park in Indonesia. In the Philippines in January of 1999, WWF launched a Sulu-Sulawesi Marine Protection Campaign with the endorsement of six Philippine Cabinet members. The goal is to rapidly expand conservation action in key areas before it is too late.

### 6.1.1

#### Tubbataha Reefs National Marine Park (TRNMP)

TRNMP is the Philippines only marine World Heritage Site and is a critical marine protected area with over 11,000 hectares of reef within its 32,000-hectare border.

- a. Continued quarterly biological monitoring trips to track changes in reef condition;
- b. Trained TRNMP and WWF staff as fish wardens and fish examiners to enable them to arrest violators of TRNMP rules and other regulations on destructive fishing;
- c. Apprehended illegal fishers and filed seven complaints against these fishers for violations including (i.e. fishing without permits; unlicensed boats; illegal possession of live groupers; fish caught using cyanide). Arrest warrants were issued for two groups of these illegal fishers. The other five cases are still pending municipal court rulings;
- d. Apprehended two boats anchored within the TRNMP boundary on May 10<sup>th</sup>, 2000. Formal complaints against these boats were filed in Municipal Court;
- e. Apprehended and confiscated an illegal shipment of fish captured by the use of dynamite on a road in Palawan;
- f. Arranged enforcement training with the support of the U.S. Department of Interior through their USAID grant (training to be held in February 2000);
- g. Surveyed dive tourists in their willingness to pay for conservation at TRNMP and initiated a financing scheme to support the recurring cost of conservation at TRNMP through the collection of dive tourism conservation fees. Each foreign diver pays a US\$50US conservation fee to dive at TRNMP, while Filipino divers pay US\$25;
- h. Proposed to UNESCO the expansion of Tubbataha World Heritage Site to include adjacent reefs;
- i. Arranged for Dr. Phillip Lobel of Woods Hole Marine Institute to launch a study of larval dispersion, identification of fish spawning aggregations, and remote enforcement surveillance using auditory detection devices;



Patrolling & Law Enforcement

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- j. Strengthened the Tubbataha Management Board through training in natural resource management.

### 6.1.2

#### **Anilao Municipal Marine Protected Area, Balayan Bay the Philippines**

Anilao, the most popular dive site in the Philippines, is situated within the biologically outstanding Balayan Bay. Anilao is only a four-hour drive from Metro Manila and is therefore an excellent venue to demonstrate marine protection to decision-makers. WWF has chosen Anilao and Balayan Bay as its second site within the SSME Protection Campaign. The focus of activities at Anilao is currently with the municipalities of Mabini and Tingloy.

- a. Supported daily patrols to enforce Marine Protected Area regulations (USAID funds support staff, fuel, and equipment for these patrols);
- b. Initiated organization of a composite team including local communities, local government, and NGOs to institutionalize patrolling and enforcement activities;
- c. Conducted paralegal training for the Bantay Dagat (Sea Watch), police officers and barangay captains of Tingloy, Batangas attended by 45 participants and held from November 18-19, 1999;
- d. Signed a trilateral agreement with Ocean Heritage Foundation and the local multi-sector management group for the implementation of mooring buoy project through the communities, November 1999;
- e. Coordinated the implementation of the installation of mooring buoys around Mabini and Tingloy, October-November 1999;
- f. Developed and produced Information, Education, and Communication materials and in its operations around Mabini and Tingloy, October-November 1999;
- g. Assisted in the preparation and attended meetings related to the training needs analysis for marine enforcement hosted by the U.S. Dept. of Interior, December 1999;
- h. Provided training on marine law enforcement both through the DOI sponsored training program and through follow up training to expand the reach of the enforcement training effort;
- i. Undertaken review of existing policies of Mabini and Tingloy pertaining to fisheries, tourism, permitting, environment and other aspects relevant to MPA management;
- j. Initiated a GIS analysis to delineate the municipal boundaries of Balayan Bay and its

protected areas.

### 6.1.3.

#### **Improved Coastal Resources Management at Bunaken National Park, Indonesia:**

Bunaken National Park has long been well known for its outstanding coral reefs, characterized by coral caves and drop off. Additionally, Bunaken is now famous for being one of only two sites in the world with an extant population of coelacanth. Thought to be extinct for 60 million years, coelacanths were discovered off the coast of the Comoro Islands in East Africa in the 1930s. In 1997, Dr. Mark Erdmann, a researcher working in Bunaken discovered a coelacanth in a fish market. Since that time several specimens have been found with local fishermen and in only November of 1999, live coelacanths were observed by submersible in their natural habitat in the southern Sulawesi Sea near Toli Toli.

- a. Observed coelacanth in situ through a submersible survey at Toli Toli;
- b. Assessed the distribution and numbers of coelacanths by interviewing with local fishermen in Bunaken, Manado Tua, and Siladen islands;
- c. Planned detailed daily surveys for coelacanth, sharks, dugongs etc. in areas around Bunaken;
- d. Conducted an expedition along the coast from Toli Toli to Bunaken conducting interviews with local fishermen and carrying out site surveys to determine the likelihood of suitable coelacanth habitat and frequency of catch by local fishermen. (based upon the recent find of live coelacanths in Toli Toli and catches of coelacanths in Manado Tua);
- e. Conducted a survey expedition to the Pangandaran/Sunda Strait;
- f. Worked with school administrators in Bunaken to initiate an education program that will start during the next two months;
- g. Community Reef Watchers team (Tim Raja Laut), monitoring daily fish landings including sharks and turtle catches at Bunaken and Manado Tua;
- h. Sponsored a training meeting in late December for the Reef Watchers team to review the monitoring protocol. Monitoring was initiated on January 5<sup>th</sup>, 2000.

The Coelacanth is proving to be a powerful Flagship species, helping mobilizing support for conservation from a wide range of community stakeholders in and around Bunaken National Park.

### 6.1.4.

### **Environmental Education and Management at Semporna Islands Project, Malaysia**

The Semporna Islands Project is a three-year collaborative venture between the Marine Conservation Society, Sabah Parks, WWF Malaysia and Nature Link. Semporna is recognized as important and unique. A wide range of marine and terrestrial ecosystems is represented, including forest, mangrove, sand and rocky shorelines and coral reefs. Several of the islands are inhabited, and the waters and reefs are an important resource for the local community. Biodiversity is very high both on land and in the sea and, looking ahead, there is great potential for Eco-tourism development. The park was gazetted as a Marine Park in April 2000.

- a. Initiated the environmental education program, aimed at schools, villages and towns both in and around the proposed park, local government officers and the tourist industry in order to promote the concepts of sustainable resource use, maintenance of biodiversity and benefits of management of the park. This activity has involved several workshops for teachers, local government, the tourism industry, and park residents and users;
- b. Prepared and delivered educational materials – the aim of which was to ensure that messages about the project would reach the target audience;
- c. Identified features of the area relevant to the park development and the sustainable use of natural resources;
- d. Undertaken biological field surveys to identify and map the marine environment; the ornithological, mammalian, and entomological importance of the island; and the fisheries resources;
- e. Assessed the current economic value of the islands and surroundings;
- f. Evaluated Needs and Impact of Tourism on the Islands;
- g. Produced of a Resource Atlas incorporating all the above information;
- h. Delivered a training course on reef ecology, conservation, identification, survey and monitoring techniques was organized by the University of Sabah for Sabah Parks staff;
- i. Informally trained Parks staff as they work with project staff on village visits, biological surveys, and other activities.

### **6.2. IMPROVE UNDERSTANDING OF THE IMPORTANCE OF MARINE CONSERVATION IN CRITICAL SITES IN THE SSME (FOCUS ON PALAWAN)**

To date, WWF has organized several environmental awareness workshops in Puerto Princessa with various interest groups such as the local resources management authorities, the Palawan Network of NGOs Inc., the Tubbataha Protected Area Management Board, and others.

WWF is preparing “Marine Conservation Awareness Kits” in Filipino. The kits include: a primer about marine conservation, trainers’ guides, a sticker-flyer, a video and a cassette containing suggested radio scripts. A total of 100 kits for trainers and 5,000 kits for target audiences will be produced. The kits will be finalized by August 2000. WWF has also started to identify trainees for Information, Education, and Communications training workshop focused on how to use the kit as a tool for non-formal education.

WWF has developed education materials that particularly stress the economic importance of marine resources. Many communities throughout the Philippines are very concerned with improving their economic condition. As a result, WWF is working with these communities to demonstrate the linkage between resource conservation and economic stability.

Additionally, Fuji Xerox Corporation provided WWF with a mobile education vehicle, which has toured Palawan delivering environmental education programs in several towns and villages. Radio plugs have accompanied these programs and WWF also holds periodic radio shows on environmental issues in Palawan. WWF feels that it is critical to establish a solid foundation of understanding of environmental issues in Palawan.

WWF has worked with the Palawan Network of NGOs Inc. on training of trainers programs so members of this NGO network can provide environmental education programs in the field in villages and towns throughout Palawan. WWF feels that it is critical to establish a solid foundation of understanding of environmental issues and particularly their linkage to economic concerns in order to build support for conservation in the long-term.

WWF has also conducted a stakeholder’ meeting/forum in Palawan to expand support for the Sulu-Sulawesi Marine Ecoregion Program. This meeting involved numerous stakeholders from Government, communities, NGOs, and others to discuss the SSME Program and invite their involvement. The program was well received and many organizations have committed to participation. Similar stakeholder workshops will be held in other provinces.

### **6.3 TO INCREASE UNDERSTANDING OF CONSERVATION PRIORITIES AND NEEDS ACROSS NORTH SULAWESI AND EAST KALIMANTAN AS PART OF THE ERBC PLANNING PROCESS**

A priority activity over the last six months has been to initiate ERBC planning and assessment in the Indonesian portions of the SSME - North Sulawesi and East Kalimantan. Of all areas of the SSME, these are the least understood and least studied in terms of their important marine resources, biodiversity attributes, and management issues.

During the period September-December, coordination meetings were held in Manila for representatives from Indonesia, the Philippines and Malaysia and the first phase of assessment reports were prepared to help prioritize conservation needs and facilitate preparation of a Biological Vision for the entire Eco-Region. Specifically the following reports on Northern Sulawesi and Eastern Kalimantan were prepared and submitted to the SSME Coordinating Committee:

- a. A Biophysical Assessment report, focused on summarizing available data on habitats and species, including lists of perceived priority conservation/biodiversity features and research needs;
- b. A Socio-Economic assessment which goal was to gain a broad understanding of human-environment interactions including trying to identify the causal connections between human actions and threats to marine biodiversity in the Ecoregion;
- c. A Coastal and Watershed review examining land-use patterns in the coastal zone and catchment areas and, where possible, identifying activities, issues, or installments that could be considered to a threat to marine or coastal ecosystem health or integrity, either at present or in the future.

During the period February-April, a series of field visits were carried out to meet stakeholders and address knowledge gaps. Large areas of the Sulawesi coast are still unexplored and represent a significant knowledge gap in planning for conservation of the Sulu-Sulawesi Sea. The conservation context in East Kalimantan is extremely complex with many issues revolving around the sale of concessions for turtle egg harvesting.

- a. A Scoping assessment of habitats, status and threats to coastal marine environments between Toli Toli and Bunaken along the southern margin of the Sulawesi Sea. Scientists have not previously visited this section of coast and conducting a rapid assessment survey was considered a priority;
- b. Participation in stakeholder meetings held in March 2000 in the Berau Islands, East Kalimantan, providing an opportunity to meet potential partners among local and national NGOs and clarify specific opportunities for action;
- c. Preparation of a strategy for scientific monitoring of green turtle nesting population in Berau islands to assess impact of egg harvesting on population and to provide input for an education/communication campaign.

#### **6.4 USING MARKET FORCES TO TRANSFORM THE MARINE ORNAMENTALS INDUSTRY IN THE PHILIPPINES AND INDONESIA INTO ONE BASED ON QUALITY AND SUSTAINABLE USE OF CORAL REEFS BY DEVELOPING THIRD PARTY CERTIFICATION SYSTEM**

WWF is administering USAID funds on behalf of the Marine Aquarium Council (MAC) to support its efforts to transform the marine ornamentals industry to environmental responsibility. With ninety percent of the trade in marine ornamental species into the U.S., there is a significant opportunity for the U.S. based industry, Government, and conservation organizations to work with partners in collecting countries to transform the marine ornamentals trade to an environmentally responsible industry. This transformation would have significant benefits to coral reef conservation in collecting countries, as collectors become stewards of reef habitat.

In the past six months, MAC has pursued a number of these activities and set a strong foundation from which to pursue others. Progress includes:

#### Network Development

Efforts in late 1999 focused on establishing familiarity with MAC and certification among key stakeholder groups in strategic locations. A growing network of industry, hobby, government and NGOs has been established in major Western Pacific source countries including Indonesia and the Philippines and in the principal import countries. Particular effort has been placed on developing government relations, including through participation in the US Coral Reef Task Force and International Coral Reef Initiative. MAC is also responding to media interest in the marine ornamental trade, and is increasingly sought out by the media. The MAC Network database contains almost 900 individuals from 40 countries. Regular information is provided via the website and "MAC News" bulletins every 2-3 months.

Progress in Network Development includes:

- a. Industry stakeholders: Network very well developed in SE Asia, Pacific Islands, US and parts of Europe;
- b. Hobby stakeholders: Network very well developed in US and beginning in Europe;
- c. Government stakeholders: Network well developed very rapidly in US government agencies and with some key EU, Philippines' and Indonesian agencies;
- d. Public aquarium stakeholders: Network very well developed in US and well started in Europe;
- e. Environment NGO stakeholders: Network very well developed in US and well started in Europe;
- f. Scientific community stakeholders: Very well developed network, being formalized through development of a MAC Scientific Advisory Committee;

Additionally MAC has developed Terms of Reference and identified candidates for the MAC Coordinator for the Philippines and Indonesia has requested additional funding to support these positions in FY 2000. A preferred candidate has been identified for the Philippines and arrangements for setting up an office have been initiated.

As these positions are filled within the next six weeks to two months, MAC will:

- a. Convene a Multi-stakeholder Workshop in Indonesia to raise awareness of MAC and develop an action strategy for Marine Ornamental certification in Indonesia. This workshop will be held in July or August of 2000.

### Certification System Development

The ambitious certification development timeline established during MAC's Strategic Planning calls for the standards of best practice to be finalized and tested in marine ornamentals collection and trade in 2000. Following this, MAC will undertake information dissemination and certification training in parallel with awareness raising among hobbyists and public aquariums. The dissemination and training will include development of manuals that guide industry participants through self-evaluation procedures and explain how to upgrade systems and practices to achieve "certifiable" standards and training materials for collectors and industry personnel. A working draft of the MAC Standards of Practice was produced in mid-1999.

Certification development studies have begun to identify certification documentation system needs and analyze the costs and benefits of certification. Workshops on certification standards were convened by MAC at the Marine Ornamentals '99 Conference to gather broader stakeholder input.

MAC hosted a strategic planning workshop in March in San Francisco. Key players from the marine ornamentals industry, NGOs, certifying agencies, and foundations participated in establishing a conceptual framework for the MAC. The process generated increased enthusiasm for the certification process and clarified many of the steps the MAC and partners must pursue to get certification up and running. One of the most immediate steps is finalizing biological and handling standards for certification. Initial versions of these will be completed by October 2000.

MAC is also collaborating to develop an international data recording and reporting system that will allow certification and labeling to be developed based on consistent, comprehensive, quality information on the marine ornamental trade.

*During calendar year 2000, certification systems will be designed and MAC will work through its coordinators to undertake testing and training with willing industry participants for certification implementation in the Philippines and Indonesia. This will test the system and the industry's capacity to operate according to the standards, as well as the linking*

aspects of the system, e.g. product tracking and documentation.

**TABLE OF PROGRESS IN MEETING KEY ACTIVITT BENCHMARKS**

<b>Benchmark Number</b>	<b>Benchmark/Output</b>	<b>Status*</b>
6.1.1 & 6.1.2	Enhancement of the Marine Enforcement Campaign at Tubbataha, Anilao (Halting of destructive activities).	On-Track
6.1.3 & 6.1.4	Enhanced Conservation Action at Bunaken and Semporna Island.	On-Track
6.2	Improved Understanding of and participation in Marine Conservation by stakeholder groups in 5 Municipalities of Palawan.	On-Track
6.3	Improved understanding of critical marine resources and threats to North Sulawesi and East Kalimantan upon which to base ERBC conservation strategy development.	On-Track
6.4.1	MAC capacity expanded to enable consultations with stakeholders and network development. MAC capacity created for organizing training and testing of certification.	Delayed
6.4.2	Greater range/number of stakeholders understanding certification and involved in MAC network. Expanded stakeholder participation in workshops and training on certification. Expanded participation in certification testing and implementation.	On-Track
6.4.3	Improved understanding of marine aquarium industry and certification among stakeholders, increased among stakeholders, expanded and strengthened network on certification, identification of key issues, opportunities and priorities for certification, and indicative work-plan for developing certification in Indonesia.	On-Track
6.4.4	Standards and certification system adapted by county Working Groups. Standards and certification system tested in test strands of collection (or culture)-to-export. Results of testing documented and provided to international standards Working Group.	On-Track
6.4.5	Manuals and training materials adapted to region by country Working Groups and consultant. Manuals and training materials disseminated. Evaluation of ability to comply with standards by industry participants (including collectors). Training provided to industry participants to assist them to upgrade systems and practices to meet standards.	On-Track

\* Status may include activities that are completed, on-track, delayed, mixed performance, or cancelled.

## CHALLENGES AND LESSONS LEARNED

1. **Adequate Stakeholder Consultation is essential:** It became extremely apparent this year, when the Tubbataha Protected Area Management Board (TPAMB) issued a letter to the dive industry mandating the collection of a dive tourism conservation tax. There was a backlash by the diving industry at the lack of consultation. Although the dive industry had enthusiastically participated in “willingness to pay” surveys, the results of these surveys had not been sufficient communicated to the industry and there had not been consultation about what level of fee to set. This consultation is now under way.
2. **Stakeholder Consultation for ERBC Planning is essential and should be pursued early on:** The ERBC process for SSME is trying to develop an Ecoregion Conservation Strategy. This is a very large effort involving numerous stakeholders. In planning for a Biodiversity Visioning workshop in June, WWF-Philippines recognized that stakeholders had not been sufficient consulted about the SSME ERBC process and were not yet “bought in” to the process. As a result, several stakeholder workshops have been planned around the Philippines to encourage stakeholder participation in the design of the ERBC process. The first one was in Palawan in earlier February indicated significant stakeholder interest in this effort.
3. **Tri-national Cooperation for ERBC Takes Time:** The process of developing an Ecoregion based Conservation Strategy is challenging due to the complexity of coordinating the interests of stakeholders in three countries. For example, just completing bio-assessments from each country in a format that can be integrated into a meaningful Ecoregion wide assessment has been challenging and required time and patience. The main lesson here is that when you are trying to develop an effort to mobilize and enhance conservation at the scale of a large ecoregion, you must take the time needed to work out the challenges along the way.
4. **Don’t Forget Immediate Protection:** Important areas not conserved in the short-term through prioritization and strategic planning. While we work to develop plans to guide lasting conservation, immediate protection must be a high priority. This is why funding support from the USAID, which is very focused on immediate results, has been so important.
5. **It’s a Major Challenge to Start a New Paradigm:** MAC has made significant progress this year. Within this progress, one major challenge has been to consult with and inform stakeholders about the new paradigm in the marine ornamentals industry while simultaneously building that paradigm. While MAC has welcomed opportunities to brief the media and players in coral conservation such as the Coral Reef Task Force, this requires a great deal of attention and time. Responding to the urgent need to inform and guide the debate on certification while simultaneously developing certification standards and systems is challenging. MAC continues to manage this challenge extremely well and we are ever closer to an environmentally responsible marine ornamentals industry. The

role of partnership in helping MAC to manage this challenge has also been key as numerous organizations from industry, Government, and NGOs have been extremely supportive in both developing the system and in consulting with the media, the public, and other stakeholders.

# **APPENDIX A**

## ***Ecoregion Based Conservation Unit***

***Workshop Summary***

***&***

***EAI Job Descriptions***

## **Ecoregion-Based Conservation: On the Move** ***ERBC Workshop Summary***

For three days, ERBC coordinators, Program Office Reps, CEOs, and resource people from across the network came together to explore, share, and strategize about how to keep ERBC on the move with an action-oriented and visionary approach. Using a mix of plenary sessions, small group teamwork, and participatory activities, the group identified next steps (programmatic and operational) for increased success in implementing ERBC. The workshop design created an open and collaborative atmosphere that resulted in productive discussions, networking, sharing lessons learned, and key recommendations.

An important outcome of the workshop was consensus on several fundamental principles:

- ❑ Using ecoregions as the “unit” of conservation is both appropriate and visionary.
- ❑ WWF's touchstone is the biodiversity vision.
- ❑ WWF is well positioned in the conservation community to advance ERBC-an ambitious approach to increasing our conservation impact.
- ❑ Doing ERBC means balancing on-going action with analysis and long-term visioning.

### **Brief Summary of Workshop Activities**

*Friday:* Action Network participants joined the ERBC coordinators and resource participants for a morning session that used four “live” case studies (the Chihuahuan Desert, Carpathians, Russian Far East, and Gulf of California) to explore how to develop a conservation strategy. The cases provided a grounding as participants grappled with how we move from where we are today to actually achieving the stated conservation goals for the region, focusing on the action steps. In the afternoon, the participants identified critical issues facing ERBC-from structure to process. After prioritizing, two key issues emerged from these discussions: how to balance action and analysis and how to improve internal collaboration.

*Saturday:* ERBC participants were joined by CEOs, PO Reps, and other network staff, which provided a dynamic mix of perspectives, experiences, cultures, and expertise. The morning session provided an opportunity to focus on critical issues, with eight surfacing for more in-depth discussion.

In the afternoon, the participants explored six thematic questions, within the context of an ecoregion. For example, one group explored issues relating to the long-term vision, using experiences from the Pantanal to inform the discussions. Another group focused on building constituencies through education, information, advocacy, and campaigns, with grounding in the Northern Andes ecoregion. Each group

produced a set of next steps to move forward on these issues, which were summarized in plenary report-outs and used to inform the discussions for Sunday.

*Sunday:* The workshop built on earlier discussions by addressing key questions (selected from the issues raised on Friday and Saturday), including operational issues related to implementation of ERBC by the network. The workshop concluded with participants creatively capturing the essence of the workshop to report back to the Annual Conference.

### **Key Themes and Recommendations**

Several key themes emerged from the workshop including: common vision, collaboration within WWF, strategic partnerships, sustainable funding, internal and external capacity building, monitoring and evaluation, structure (governance), and management. The following include a sample of the recommendations focusing on these key themes:

#### ***Vision***

- ❑ Develop an ecoregion vision that is bold, ambitious, and emotional. It should be an inspirational "sound bite" that "stops people in their tracks" and motivates and engages stakeholders and partners.
- ❑ Work with partners and stakeholders to develop a holistic conservation strategy that brings together the long-term biodiversity goals and the socio-economic dimensions.

#### ***Collaboration within WWF***

- ❑ Review institutional structure and governance by forming a working group to look at a number of ecoregional cases focusing on how to achieve greater ecoregion collaboration and the institutional changes that are needed to promote greater collaboration.

#### ***Strategic Partnerships***

- ❑ Increase GIS and remote sensing capacity (within WWF and with our partners) through increased training and resource pooling across ecoregions.
- ❑ Strengthen capacity for more effective interaction with the business community (i.e. organize 3-6 month staff exchanges with private enterprises and create a business unit within the network drawing on personnel from private sector initiatives such as MSC and FSC).

### ***Sustainable Funding***

- ❑ Develop single, coherent proposals for ecoregions, explore trans-national proposals that link several ecoregions under a biome-theme.
- ❑ Compile information highlighting specific results, activities, and messages that will allow us to develop effective proposals.

### ***Capacity Building***

- ❑ Strengthen capacity for conservation at the ecoregional scale in the areas of biology, communication, advocacy, education, process and planning.
- ❑ Increase our capacity to understand the socio-economic-political dimensions of ERBC and determine how to best access the external expertise we need.
- ❑ Enhance our tools/strategies for learning from each other. Several suggestions were recommended including peer learning through exchanges, lessons learned/case study workshops, more effective use of existing technologies (web, newsletters, etc.)

### ***Monitoring and Evaluation***

- ❑ Develop system indicators for the global ERBC process and pilot throughout the network.
- ❑ Institute peer review exchanges and learning between Action Network and other ecoregions.
- ❑ Enhance the project database to facilitate ERBC monitoring drawing criteria/tools already developed for the ERBC program.

## **SCOPE OF WORK**

### **TECHNICAL ADVISOR TO THE ENTERPRISE FOR THE AMERICA'S INITIATIVE FOUNDATION (EAI FUND) IN BOLIVIA**

The EAI Fund Technical Advisor, with experience in private foundation development and management, will provide technical assistance to the General Manager, Board and staff of the EAI Fund in the establishment and implementation of the Fund. The Advisor will be based in the EAI Fund Office in La Paz and will be counterpart to the General Manager of the Fund. The Advisor will be an employee of the World Wildlife Fund and report directly to the Country Representative for the World Wildlife Fund in Bolivia. The Advisor position will be for a three-year period during which time procedures should be established and the counterpart trained.

#### **RESPONSIBILITIES:**

1. Provide technical assistance in the establishment and implementation of financial management procedures for the EAI Fund.
2. Provide technical assistance in the development and implementation of the EAI Fund program including long-term strategic planning and project approval and monitoring and evaluation procedures.
3. Provide technical assistance for EAI Fund external communications, outreach and public relations.
4. Provide technical assistance in financial planning and fundraising.
5. Support and train Board Members and Executives in all aspects of Foundation planning, management and evaluation.
6. Represent WWF as designated by WWF's Country Representative.

#### **MINIMUM REQUIREMENTS:**

1. Bachelor's degree in a related discipline (administration, finance, organizational development, etc.). Master's degree preferred.
2. Relevant experience in the development and management of private foundations.
3. Minimum of five years experience working in institutional development.
4. Fluency in Spanish, verbal and written.

## **SCOPE OF WORK**

### **CONSULTANT TO THE ENTERPRISE FOR THE AMERICA'S INITIATIVE FOUNDATION (EAI FUND) IN BOLIVIA Team Leader**

The EAI Consultant, with experience in private foundation development and management, working with a local counterpart consultant, will provide technical assistance to the General Manager, Board and staff of the EAI Fund in the definition of guidelines and procedures for the administration of the Fund. The Consultant will also provide advice on methodologies for improving the strategic focus of the Fund and outreach to potential beneficiaries. The Consultant will be based in the EAI Fund Office in La Paz, will be contracted by the World Wildlife Fund and report directly to the Country Representative for the World Wildlife Fund in Bolivia.

#### **TASKS:**

1. Review consultant reports of El Ceibo, CEHAV and ANDINA and interview if necessary to understand recommendations
2. Interview key EAI staff and Members of the Technical Working Group to solicit comments over the consultancies and share ideas
3. Define an improved set of guidelines and procedures for EAI Fund administration including:
  - financial management,
  - outreach and communications and
  - project development, selection, evaluation and monitoring
4. Make recommendations on how to improve:
  - Strategic focus
  - Board development
  - Fund investment
5. Make a presentation to interested parties to discuss guidelines, procedures and recommendations and present draft report in Spanish.
6. Present final reports in Spanish and English.

#### **MINIMUM REQUIREMENTS:**

1. Bachelor's degree in a related discipline (administration, finance, organizational development, etc.). Master's degree preferred.
2. Relevant experience in the development and management of private foundations, preferably in Bolivia.
3. Minimum of five years experience working in institutional development.
4. Fluency in Spanish, verbal and written.

**TIME FRAME:** 20 Consultant Days

# **APPENDIX B**

## ***Bering Sea Ecoregion***



# *Ecoregion-Based Conservation in the Bering Sea*

Identifying Important Areas for Biodiversity Conservation



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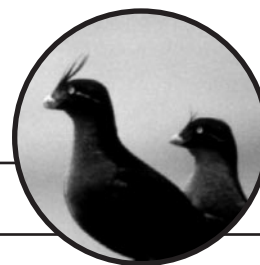
Edited by: David Banks, Margaret Williams John Pearce, Alan Springer, Randy Hagenstein, and David Olson

Publication design by Eric Cline

Maps and GIS Data by: Emma Underwood, Jennifer D'Amico, Carrie Wolfe, and Julie Maier

A collaborative effort by the World Wildlife Fund, The Nature Conservancy of Alaska, and Participants in the Girdwood Bering Sea Experts Workshop March 20-23, 1999

Cover photo of walrus by Kevin Schafer, provided courtesy of the photographer



## *Executive Summary*

For centuries, the Bering Sea has shaped the lives and cultures of the diverse people who live near the sea and depend upon it. At the heart of their communities lies the Sea's extraordinary abundance and productivity. The area supports North America's largest concentration of breeding waterfowl and shorebirds, the highest concentrations of Pacific walrus on earth, the world's largest eelgrass beds, over 80% of the world's population of breeding female polar bears, and 70% of the world's northern fur seals concentrated in just a few sites. It is the only sea harboring red-legged kittiwakes. And unlike many of our once great seas, it still maintains one of the most productive fisheries remaining on Earth.

In recent years, however, the residents of these Bering Sea communities have noticed marked changes in the sea. They and others- scientists and visitors, resource managers and users, have begun to express concern over the health of the Bering Sea.

Around the world, from the Grand Banks to the southern reaches of Chile, the health of marine ecosystems is seriously at risk. Fisheries have collapsed. Economies have been disrupted, and communities transformed. Yet the Bering Sea is only beginning to exhibit such trends. In the Bering Sea, we have the opportunity to prevent further losses associated with human activities.

While we understand that we cannot control the changing nature of the marine environment, we can make decisions about our own behavior that make for healthier oceans and seas, more resilient to stress. In making such choices in the Bering Sea, we give ourselves a greater chance for building long-term, sustainable human economies, for conserving the incredible richness and variation of marine life, and for ensuring the continuity of the region's vibrant cultures.

Recognizing the present opportunity in the Bering Sea and the immediate need for a strategic plan for the future, The World Wildlife Fund (WWF) and The Nature Conservancy's Alaska Field Office (TNC) joined in a conservation initiative to evaluate the Bering Sea for habitat conservation.

This document outlines the results of the first part of that initiative - a workshop co-sponsored by WWF and TNC in Girdwood, Alaska, March 20-23, 1999. The workshop was designed to identify the key biological features and ecological processes that define the sea and contribute to its unique richness and productivity.

The report from this workshop has several components:

- an overview of the ecoregion-based conservation approach, as defined by WWF and TNC;
- a description of the process used in the Girdwood workshop to identify key areas for biodiversity in the ecoregion;
- a discussion of threats to Bering Sea biodiversity;
- maps outlining the areas important for each major taxa group of Bering Sea species;
- a map presenting the results of our collective discussion about priority areas for biodiversity conservation;
- and finally, detailed descriptions of these priority conservation areas.

In preparation for the workshop, TNC and WWF collaborated with the Institute of Marine Science of the University of Alaska-Fairbanks, as well as many other organizations and institutions in the U.S. and Russia, to compile existing ecological information and databases from both sides of the Bering Sea.

At the workshop, participants incorporated this data into their analyses, while also drawing on their own knowledge and field experience to identify the Bering's key biodiversity features - habitats, species concentrations and unique ecological phenomena. Experts identified the unique polynyas south of

St. Lawrence Island and south of the village of Sireniki in the Gulf of Anadyr. They identified numerous important seabird colonies such as those on the Pribilof, Commander and Aleutian Islands. Experts discussed and mapped high plankton concentrations in the Bering Straits. Mammal experts mapped irreplaceable concentrations like the walrus haulouts on the north side of Bristol Bay and beluga feeding areas within the Anadyr Delta. Experts also identified unique waterfowl and fish habitat like the eel grass beds of Izembek Lagoon and wetlands of the Yukon-Kuskokwim Delta.

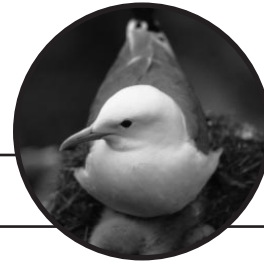
A wide range of experts from both sides of the Bering Sea participated in the workshop, including scientists, local fishermen, community members, resource managers, conservationists, and educators. For two days, experts worked across disciplines and regional specializations to highlight key features in the region and create maps of the special areas of the Bering Sea. Their work has helped to create a picture of the Bering Sea's most important conservation areas and processes (See Map 8).

This report provides a foundation on which WWF and TNC, with others, will develop more detailed strategies for biodiversity conservation in the Bering Sea. Additional information will be added over time to demonstrate changes in the sea, such as shifts in species distributions, or changes in conditions of the ice edge. Information about threats to biodiversity and human health, such as toxic contamination of wildlife, may also be added.

TNC and WWF will use the report to guide our own conservation efforts in the Bering Sea, and to contribute to the greater body of Bering Sea knowledge. It is our hope, however, that this report will serve not only as a useful public informational resource, but also as a catalyst to more widespread, coordinated and focused conservation of this unique marine and coastal environment.

◆ Coastal sand dunes, Nunivak Island





## ***Part One – Background***

### ***1.1 Introduction***

The mission of the World Wildlife Fund is the conservation of nature. Using the best available knowledge and advancing that knowledge where we can, we work to preserve the diversity and abundance of life of Earth by protecting natural areas and wild populations of plants and animals, including endangered species; promoting the use of renewable natural resources; and promoting more efficient use of resources and energy and the maximum reduction of pollution.

The mission of The Nature Conservancy is to preserve the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive.

Historically TNC and WWF focused efforts on species, then looked toward protecting their habitats in larger ecosystems. However, more recently we have concluded that in order to achieve success in conservation, we need to work on even broader scales, considering ecological processes and threats that occur across many ecosystems. We call this approach ecoregion-based conservation.

Ecoregions are relatively large areas delineated by biotic and environmental factors that regulate the structure and function of ecosystems within them. For the purposes of this report, we defined the Bering Sea ecoregion as the area enclosed to the south by the Aleutian Chain and to the north by the Bering Strait; the waters and coastal fringe of the Bering Sea; and the southern Chukchi Sea.

### ***1.2 Why conduct Ecoregion-based conservation?***

Several beliefs drive the shift towards ecoregion-based conservation. First, conservation planning at scales higher or broader than specific sites will more effectively conserve the full range of biodiversity and promote its persistence.

Second, many significant threats to biodiversity operate at the scale of multiple sites. Third, coordinated regional efforts can facilitate the creation of new partnerships and alliances and can help to avoid redundancy among groups working independently. Fourth, this approach can more accurately define an area for conservation, remediation, restoration or other management regimes than those primarily based on connecting sites or tailoring plans to political boundaries or agendas. Finally, comprehensive ecoregion-based strategies will have a greater leveraging effort, creating more political impact and donor interest and support than initiatives focused solely on sites.

Ecoregion-based conservation also helps us:

- Understand how local actions fit into regional and global conservation strategies;
- Ensure that there are clear and strong linkages between all conservation activities and biodiversity conservation objectives;
- Assess how well conservation strategies represent the full range of distinctive biodiversity, conserve larger intact ecosystems, and maintain ecological processes and species populations within their natural range of variation;
- Determine the range and limits of natural variability of marine and coastal ecosystems and to distinguish phenomena and processes effected by natural forces from those effected by anthropogenic impacts;
- Tailor conservation analyses and activities to the particular patterns of biodiversity, ecological dynamics, and responses to disturbance of different major habitat types, such as coral ecosystems or upwelling areas; and
- Understand the tradeoffs of different actions in terms of achieving different conservation targets.

### 1.3 Description of the Bering Sea Ecoregion

One of the most productive marine ecosystems in the world, the Bering Sea is a large, enclosed sub-arctic sea bounded by Alaska's southwest coast, Russia's Chukotka and Kamchatka Peninsulas, and the Aleutian archipelago (Map One, inside front cover).

The Bering Sea ecosystem includes both Russian and U.S. waters as well as international waters (i.e., beyond the 200 mile Exclusive Economic Zone). The Bering Sea is influenced by the neighboring waters of the North Pacific Ocean, in particular the Gulf of Alaska. Additionally, the physical processes occurring in the Chukchi Sea make this water body a critical component of the Bering Sea ecoregion. The region sustains over 100,000 people, including the Aleut, Yup'ik, Cup'ik and Iñupiat peoples who live along the Alaska coast, as well as Koryak, Yup'ik and Chukchi peoples along the Russian coast and Aleut people on the Commander Islands. U.S. commercial fisheries in the Bering Sea approach \$1 billion per year and account for more than half of all annual domestic fish landings. In the 1990s, Russian catches of fish and invertebrates in the Bering Sea comprised a third of the country's commercial harvest. These fisheries generated approximately \$600 million per year.



USFWS

◆ *Yupik child*

### 1.4 Biological Significance

The Bering Sea supports a wealth of biological diversity, including more than 450 species of fish and shellfish, 50 species of seabirds, and 26 species of marine mammals. The coastal fringe, including eelgrass beds, extensive coastal lagoons, deltas, wetlands, and estuaries, supports a similar abundance and diversity of waterfowl. Alaska's Yukon-Kuskokwim Delta, one of the world's largest wetland complexes, serves as breeding and feeding grounds for 750,000 swans and geese, two million ducks, and 100 million shorebirds and seabirds. The islands that punctuate the Bering Sea, such as the Pribilof Islands, St. Lawrence and St. Matthew, the Aleutians, and the Commander Islands provide critical breeding grounds for millions of seabirds, Steller sea lions, and northern fur seals.

At sea, much of the biological activity focuses on areas of nutrient upwelling along the Aleutian Arc, the edge of the continental shelf, across the northern shelf and along the Russian coast from the Kamchatka Peninsula to Cape Navarin.

Additionally, open waters associated with ice-covered seas (areas known as polynyas) are highly productive areas critical to the region's biota. Passes in the Aleutian Islands (such as Unimak Pass) and the Bering Strait further focus migrating species in key, sensitive areas.

### 1.5 Changes in the Bering Sea

Throughout the last century, commercial whaling and fishing, introduced species, and possibly pollution have caused severe ecological changes throughout the Bering Sea. Over the last few decades, these human-caused stresses have exacerbated the natural fluctuations caused by climate change.

Signs of stress are present throughout the trophic food web. For example, the once lucrative king crab fishery is virtually gone. Herring, a previously dominant fish, has declined in the eastern Bering Sea, creating a shortage of preferred food for top predators and seabirds. Fishermen report travelling further and further as local stocks are depleted. The apparent collapse of the snow crab population (once ranked as the third most valuable fishery in the region) in 1999 is another sign of significant change in the sea.

There are other signs of significant change in the ecoregion, such as declines of a number of wildlife species. For example, today, of the 26 species of marine mammals that use the Bering Sea:

- Seven great whales are listed as endangered under the Endangered Species Act;
- The endangered Steller's sea lion has declined by 80 percent in the past twenty years;
- The northern fur seal is listed as "depleted" by the Marine Mammal Protection Act; and,
- Sea otters are declining dramatically on several Aleutian Islands: Adak, Little, Kiska, Amchitka, and Kagalaska.

Of bird species:

- The short-tailed albatross is endangered; the spectacled eider is threatened according to the under the Endangered Species Act;
- Steller's and king eiders are proposed as "threatened" species under the Endangered Species Act;
- Red-faced cormorants have declined on St. Paul Island by 70 percent since the mid 1970s; and
- Red-legged kittiwakes, an endemic species, have declined by 40 to 60 percent throughout the Pribilof Islands during the same period.

The complexity of addressing such issues in a marine ecosystem is especially challenging because of the international nature of the Bering Sea. Added to this are the problems of a boundary dispute between Russia and the United States, and less than ideal collaboration across shared borders, creating difficulties for joint management efforts.

### *1.6 Conservation Opportunities*

TNC and WWF agree that a critical part of protecting marine resources, and the sustainable economies that depend on them, is protecting biological diversity. This means protecting the full array of species that use the Bering Sea. Conservation and management plans also must take into consideration the need for populations to fluctuate, to respond to the pronounced natural variability of the ecosystem, and to maintain resiliency in the face of human-induced change.

A number of challenges to finding this balance between conservation and resource use have already presented themselves. Researchers have been unable to provide an unequivocal basis for resource management decisions or conservation action. Second, residents of Bering Sea communities have not been sufficiently included in research, management, policy development, public education and law enforcement. Third, a lack of coordination between Russia and the U.S. on research and management has caused fragmented ecological understanding and management. Finally, at the cost of habitat and species in the Bering Sea, large vested economic interests are working to assure fisheries management regimes that will provide the maximum economic return on their investment.

TNC and WWF recognize the importance of developing a strategy that:

- Focuses conservation activities on the most important places and processes for maintaining representative biodiversity in the Bering Sea;
- Integrates research, management, and policy across political boundaries;
- Ensures collaboration between and participation of key stakeholders, especially residents of Bering Sea communities;
- Improves the state of knowledge and builds research capacity;
- Manages for multiple species and desired ecosystem condition, rather than for single-species, short-term commodity outputs; and
- Employs adaptive approaches to management to test ecological hypotheses.

### *Vision for the Bering Sea*

Based on what TNC and WWF have learned from this biodiversity analysis and the Girdwood workshop, we have formulated some common overarching goals for conservation in the Bering Sea ecoregion. Our vision is that the Bering Sea be managed in a truly integrated ecosystem-based manner. Our vision includes:

- The U.S. and Russia sharing information, expertise and capacity;
- Focused research to tease out ecological complexities and understand the linkages between human activities and species declines;
- Fishing interests, conservationists, governments, and Bering Sea residents collaborating to reach jointly developed and shared goals;
- Residents of the Bering Sea involved intimately in the issues that affect them, with full participation in decision-making, research, negotiation, and management;
- Communities with the tools, knowledge, and stewardship ethic needed to affect positive change;
- A multinational coalition of communities with a strong voice in decisions; and
- A carefully regulated fishery in both Russian and U.S. waters, with full participation by Bering Sea residents and other stakeholders and economic benefits accruing locally as well as to the larger Bering Sea absentee commercial interests.

To achieve this vision WWF and TNC should work with partners at global, ecoregional, and local levels, using a variety of strategies to address threats and conserve biodiversity. These strategies include:

#### At the global level,

- Reducing greenhouse gas emissions;
- Banning production of persistent organic pollutants, which can migrate to the Bering Sea;
- Providing incentives to stop overboard dumping of plastics, netting and other debris;
- Promoting international awareness about the unique and valuable biological and cultural resources of the Bering Sea;

#### At the ecoregional level,

- Engaging Russia in a joint agreement for conservation of marine resources;
- Strengthening Russian enforcement of fisheries regulations in Russia and on the high seas;
- Promoting sustainable fishing practices on both sides of the Bering Sea, including the reduction of by-catch;
- Supporting species monitoring programs and the development of recovery plans for threatened marine species;
- Restoring depleted populations and damaged or polluted habitats
- Eradicating non-native species and preventing new species introductions;
- Establishing community-based monitoring programs to detect, document and monitor contaminants in marine organisms
- Supporting subsistence use by local people as a priority use of Bering Sea resources, consistent with sound conservation principles and practices;
- Defining marine conservation areas to provide buffer zones for populations of marine organisms; to maintain intact and sensitive communities; to build resiliency of marine organisms.

In an effort to better understand the unique biodiversity features that drive the Bering Sea, and to better define our conservation targets, TNC and WWF undertook this Bering Sea biodiversity assessment. The following chapters present the methodology used and the results of this work.

*Our Vision for the Bering Sea  
(Developed at Experts Workshop March  
1999)*

*Our vision for the Bering Sea is to ensure that species assemblages and abundances, community structure and ecological phenomena are maintained or restored within their natural ranges of variation. Within this long-term vision, the cultural diversity of indigenous Peoples is a vital part of Bering Sea biodiversity, and people locally and globally recognize the unique value of the Bering Sea and are committed to conserving it. Our vision requires working together to minimize or eliminate the impacts of alien species and to ensure there are no further human caused global or local extinctions.*

◆ Seabird colony

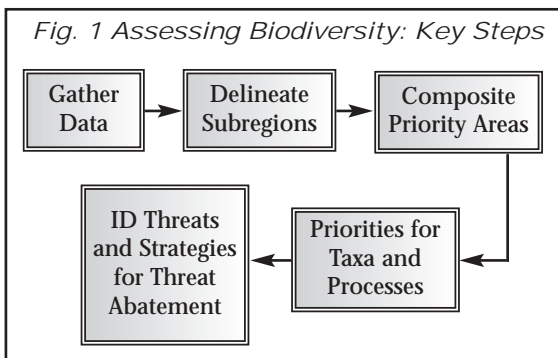


## Part Two: Workshop Report

### 2.1 Methodology: Assessing Biodiversity

The general conservation principles and analytical approach guiding this assessment have been derived from our work in other ecoregions of the world. It involves a step-wise process whereby we collect and analyze ecological data, define conservation targets and goals, identify a network of sites to meet the goals, evaluate ecoregion-wide threats, and explore possible strategies for achieving our goals in the ecoregion. (Please see Figure 1). This process is highly focused on biology: the species, natural communities, and processes have driven the final network of areas and associated strategies. Although the focus of this plan is on conserving biodiversity, we recognize the importance of the communities and economies that live and work in the Bering Sea ecoregion. We also recognize that these human communities are heavily dependent on the species this plan attempts to conserve.

Fig. 1 Assessing Biodiversity: Key Steps



#### 2.1.1 Gathering Background Data on Biodiversity

The major part of the planning process involved synthesizing and compiling available information on species abundance and distribution; biological features such as kelp beds, breeding colonies; staging areas, etc.; physical factors such as bathymetry, upwellings, and polynyas. A Geographic Information System (GIS) was used as a tool to manage, compile and present this information. The GIS was also used to record the information provided by participants in the Girdwood workshop. By compiling individual data layers (maps of one particular feature or species) and then overlaying them in various combinations, we were better able to understand where

certain groups of species congregate throughout the Bering Sea ecoregion. It also helped us understand what the relationships are between species distributions, communities, and biophysical parameters, as well as the natural variability of these features.

The first step in the information collection stage was to create basic data layers to provide the background for the biodiversity assessment. These layers included:

- Bathymetry
- Currents
- Typical upwelling areas
- Polynyas and seasonal ice edge
- Marine ecosystem classification (proposed approaches to stratify the Bering Sea ecosystem)
- Existing protected areas (state and national parks, refuges, critical habitat areas, including wilderness designations)
- Marine regulatory areas (e.g., no-trawl zones, crab closure areas, sea lion buffers, etc.)
- Seabird colonies
- Marine mammal haul-outs and rookeries
- Known concentration areas for birds or mammals (shorebird or waterfowl migratory stopovers)
- Important migratory corridors (whales, other marine mammals, birds, fish)
- Distribution of numerous species of fishes and invertebrates of both ecosystem and economic importance
- Known important or sensitive habitats (eelgrass beds, coastal lagoons, wetland complexes, estuaries.)
- Geographic features (coastline, major rivers, communities place names, latitude/longitude)

Much of the spatial information was available for the eastern Bering Sea. However, it was scattered among various agencies and organizations. WWF, TNC and Dr. Alan Springer of the University of Alaska contacted many organizations in an effort to gather and synthesize such databases. A number of informational resources were provided for this assessment. (Fig. 2).

There exists much useful reference material on marine mammals, benthic organisms, physical processes such as the role of ice in the Bering Sea and other topics (Hood and Calder 1981, Loughlin and Ohtani 1999, Continental Shelf Research 1986 and 1993, Moiseev, 1970).

## Figure 2: DATA SOURCES FOR BERING SEA GIS COMPILATION

### Existing spatial data:

- \* US Fish and Wildlife Service: Seabird Colonies of the Bering Sea
- \* National Oceanic Atmospheric and Atmospheric Administration: Coastal and Ocean Zones Strategic Assessment Data Atlas
- \* Alaska Marine Conservation Council: Essential Fish Habitat (Halibut)
- \* Wild Salmon Center: Habitat of Pacific Salmon (in prep.)

### Additional sources of expertise:

- \* Particular Alaska Native organizations in the Bering Sea (such as regional non-profit organizations) which coordinate natural resource management activities, and serve as key links to Bering Sea communities
- \* User groups such as the Society of Native Hunters of Chukotka and others in Alaska and Russia
- \* International North Pacific Halibut Commission
- \* Kamchatrybvod
- \* Kamchatka Institute of Ecology and Natural Resources Use
- \* North Pacific Anadromous Fish Commission
- \* National Marine Fisheries Service: Alaska Fisheries Science Center and National Marine Mammal Laboratory
- \* National Oceanic and Atmospheric Administration: Pacific Marine Environmental Laboratory
- \* Pacific Institute for Scientific Research on Fisheries and Oceanology
- \* Shirshov Institute of Oceanology
- \* State of Alaska: Department of Fish and Game, Department of Environmental Conservation, Department of Community and Regional Affairs
- \* University of Alaska Fairbanks: Institute of Marine Science
- \* University of Colorado: Colorado Center for Atmospheric Research
- \* University of Washington: Fisheries Research Institute

## *2.2 Experts Workshop*

Based on previous experiences, WWF and TNC believe that one of the most effective ways of gathering information in a large and remote ecoregion is to bring together experts from that particular area to solicit intensively and interactively their input on conservation priorities. Although we had initially gathered substantial information, the hands-on involvement of Bering Sea experts was essential in our identification and discussion of conservation priorities. Thus, the Girdwood workshop was convened in March, 1999.

Working first in taxonomic groups, then by regional expertise, experts "ground truthed" the maps of the Bering Sea's biological features, added their own information and expert opinions, and defined priority sites for conservation.

An important element of this project was the involvement of a wide variety of experts. Experts from resource management agencies, conservation organizations, universities, research institutes, boroughs and local communities participated. Especially valuable was the participation in the workshop by a team of Russian experts. Our Russian colleagues shared new information and perspectives from the western Bering Sea, answered questions, and completed information gaps about biodiversity and threats to the ecoregion. This broad range of expertise was important to contribute to the whole "picture" of the Bering Sea. We recognize that there are many other experts with important knowledge of the Bering Sea and we invite their comments and additions to this process.

## *2.3 Selecting Conservation Priorities: The Approach*

### **2.3.1 Step 1- Delineating Subregions**

Experts were first asked to delineate subregions within the Bering Sea ecoregion for the purposes of a representation analysis of species assemblages and habitat types. In other words, this step will help us to understand whether a conservation strategy adequately incorporates all of the ecoregion's diverse habitats and ecosystems. Subregions also help us to understand the relative importance of biodiversity features at different biogeographic scales. To determine these subregions, we reviewed existing sub-regional maps developed by Ford (1998) as well as those provided by the National Research Council (1996). Based on these maps and expert knowledge we mapped the following subregions in the Bering Sea (See Map 2, page A2).

#### **Subregion I: Bering Strait and Southern Chukchi Sea**

This area includes the northern portion of the continental shelf between Russia and the U.S., and encompasses St. Lawrence Island, Anadyr Bay, Norton Sound, and the Diomed Islands.

This subregion is distinct in that it is covered by sea ice for a significant part of each year. A variety of habitat types are found within the larger areas, including the shallow, seasonally warm, low-salinity environment of Norton Sound in the east where the Yukon River flows into the sea; the shallow but comparatively cold Gulf of Anadyr at the same latitude to the west at the Anadyr River delta; and the highly productive region between St. Lawrence Island and the Bering Strait, where strong currents flow north into the Chukchi Sea.

#### **Subregion II: Bering Sea Shelf**

This area includes the extensive continental shelf and shelf break in the eastern Bering Sea, and encompasses the Pribilof Islands, St Mathew Island, Bristol Bay and Nunivak Island.

Four marine habitat types are found here that correspond to the nature of the physical processes and depth: the inner shelf, middle shelf, outer shelf, and shelf edge domains. The shelf subregion is influenced by sea ice, but to a lesser extent than the Bering Strait subregion, and has weak current systems.

#### **Subregion III: Kamchatka Shelf and Coast**

This area includes the western Bering Sea and the coast of the Kamchatka Peninsula stretching out to encompass the Commander Islands and the shelf break off of the Russian mainland. The continental shelf is narrow and much of the subregion is dominated by the southward-flowing Anadyr and Kamchatkan currents.

### **Subregion IV: Aleutian Islands**

This subregion includes all of the Aleutian chain and surrounding waters as well as the shallow submarine ridge, Bower's Ridge, extending into the Aleutian Basin. The region of the arc is physically dynamic because of strong tidal energy and currents flowing in either direction on the two sides - the westerly North Aleutian Flow on the north side the easterly Alaska Stream on the south side. Deep passes between the islands channel currents across the arc in several locations. Very little shallow water surround any of the islands.

### **Subregion V: Aleutian Basin**

This area, with no landmasses, is a deep-water marine system with bottom depths of 3000 to 4000 m. It provides habitat for numerous fish, invertebrates, and marine mammals. It is located north of the Aleutian chain and southwest of the shelf break and occupies about half of the total area of the Bering Sea.

### **2.3.2 Step 2 – Selecting Special Areas for Major Wildlife Taxa**

While working in taxa breakout groups (birds, fish, invertebrates and mammals), participants considered several criteria to determine the importance of particular areas. These criteria include:

1. The presence of distinct or unique species assemblages, habitat or habitat complexes (such as the groups of species in Russia's Commander Islands, representing several biogeographic zones)
2. Species richness or endemism (for example, the Pribilof Islands, where millions of seabirds nest each summer)
3. Outstanding abundances or aggregation areas (including Norton Sound, an area of high summer concentrations of beluga whales)
4. Critical area for sustaining important ecological phenomena (the Bering Strait for example, is a critical migratory corridor for Pacific walrus and bowhead, beluga, and gray whales)

Based on these criteria, the selected areas were then rated for the relative significance of their biodiversity. Additionally, participants discussed whether these areas were outstanding at the level of the Northern Hemisphere, the Bering Sea Ecoregion, or the Subregion within the Bering Sea.

The groups also listed known threats to the areas and noted the current management regime, if any.

These preliminary areas for each taxonomic breakout group were then presented to the larger group for review and discussion.

What did this tell us about why the Bering Sea is so special? From a biodiversity perspective, the Bering Sea is an amazing amalgam of habitats that provide a wide range of niches for diverse flora and fauna to occupy. Moreover, the base of the food web of the Bering Sea is highly productive, supporting great abundances of many species. Among the denizens of the Bering Sea are several endemic species, Arctic and sub-Arctic species typical of many regions of the Northern Hemisphere, and species that migrate from around the world to take advantage of its bounty. Some of the particularly notable features for different taxa are presented below.

### **2.3.2i Birds of the Bering Sea (Map 3)**

From the bald eagle with its eight-foot wing span, to the diminutive least auklet, the birds of the Bering Sea are numerous, diverse, and occupy an important part of the food web in this northern region. For many birds, the Bering Sea provides unique habitat that is available nowhere else in the world. Seabirds of thirty-five species numbering nearly 20 million nest in the Bering Sea ecoregion. Only in the Antarctic is such a comparable diversity and abundance found. In addition, 27 species of waterfowl (ducks, geese) and 31 species of shorebirds nest on islands and in coastal areas of the mainland.

On St. George Island in the middle of the Bering Sea, flocks of kittiwakes, murrelets, auklets, gulls and puffins fill the sky as the birds vie for sites to make their nests in the crowded island cliffs. One of four

Pribilof Islands, St. George Island exemplifies the rich seabird life that for a short period each year, congregates in time and place.

In winter, even the harsh environment of the Bering Sea polynyas, or openings in the pack ice, offers a refuge to some species. For example, a recent discovery showed that in mid-winter, thousands of spectacled eiders (most of the world's population) gather in the open water areas of Bering Sea ice southwest of St. Lawrence Island.

The rich marine life that feeds so many birds attracts them across astounding distances. The vast number of resident seabirds doubles in summer with the influx of migrant shearwaters escaping the austral winter on their nesting grounds in the Southern Hemisphere. Shorebirds such as sandpipers and plovers, godwits and curlews make their way from Asia, Africa, Australia and the Americas to the Bering Sea ecoregion. Tens of thousands of snow geese fly from their wintering areas in California north to the Chukchi Sea each year, to breed on Wrangel Island. In the fall migration, many stop at the Yukon-Kuskokwim delta to feed. Spoonbill sandpipers move along the coast of the Russian Far East from their wintering areas in Southeast Asia to nest in northern Bering Sea wetlands. Sandhill cranes fly 10,000 miles from their wintering areas in Mexico to nesting areas on the Chukotka and Seward Peninsulas.

### **2.3.2ii Mammals of the Bering Sea (Map 4)**

Like the avian diversity of the ecoregion, marine mammal life in the Bering Sea is exceptionally rich. With representatives from north temperate regions (harbor seals), the sub-Arctic zone (Dall's porpoises) and Arctic regions (polar bears), marine mammals are diverse and numerous. They include the pinnipeds, whales and dolphins, as well as the sea otter and polar bear.

The Bering Sea provides essential habitat for several species that are found nowhere else in such high concentrations. During winter months, for example, the bulk of the world's walrus population can be found in the Bering Sea. Nearly all of the northern fur seals are concentrated in one site in the Bering Sea, the Pribilof Islands, during their breeding period. Just north of the Bering Strait, the world's largest onshore polar bear denning area can be found on Wrangel and Herald Islands.

Of the 26 marine mammal species identified in the Bering Sea, eight are listed as federally endangered in the United States. One species, the northern fur seal, is designated as "depleted" under the Marine Mammal Protection Act and the status of many species is yet unknown. The Steller sea lion is listed as endangered according to the Endangered Species Act, and is recognized in Russia as a threatened species. Another species, the sea otter, has also exhibited signs of decline. Populations in some areas in the Aleutian archipelago have decreased sharply.

The Bering Sea provides critical habitat for some of the world's largest mammals. The blue, bowhead, humpback, northern right whale, and other baleen and toothed whales make their way to the Bering Sea to feed and breed in the ecoregion, or to migrate through the Bering Sea for points north in the Chukchi and Beaufort Seas. Each year the gray whale migrates north from wintering areas in Mexico to feed on the rich benthic crustaceans in the Bering Sea. Cetaceans are found throughout the ecoregion, from the deep waters of the basin (sperm whale and Dall's porpoise), at the continental slope (minke and fin whales, and Stejneger's beaked whale) and in the rich waters of the productive shelf and coastal zones (gray, northern right, humpback, beluga, and bowhead whales).

Fur seals, harbor and spotted seals are more common in the southern parts of the Bering Sea, while ribbon, ringed, and bearded seals – whose life cycles are closely tied to the ice pack – are found in northern waters. The dwindling populations of endangered Steller sea lions, also found in the Gulf of Alaska, occur throughout the Aleutian chain, Commander Islands, and western Bering Sea.

### **2.3.2iii Fish of the Bering Sea (Map 5)**

A cornerstone of the Bering Sea food web, fish in the ecoregion exceed 400 species. Not surprisingly, the best-studied species are those that are used commercially. Indeed, the commercial fishery in the Bering Sea is one of the world's largest. For the United States, this resource is extraordinarily

important as it provides more than half of all fish and shellfish caught in our waters. Thirty species of groundfish, including 11 species of flatfish and 15 species of rockfish, are targeted. Of these, walleye pollock is the most dominant species, accounting for about half of the biomass of groundfish in the Bering Sea. Pollock sustains the largest single-species commercial fishery in the world, with peak harvests of between 4-6 million metric tons per year during the height of the fishery in the 1980s. Annual economic benefits of the pollock fishery to the US and other Pacific Rim nations exceed a billion dollars.

Among the list of marine species is the Pacific halibut. A fish with a naturally long life span, it can grow to several hundred pounds. Its seasonal migrations are striking: halibut can travel up to 800 km between spring feeding areas and the deeper waters where they spawn and winter. Halibut provide great adventure to sport fishers and is a lucrative commercial target.

The Bering Sea supports five species of salmon: chinook, coho, sockeye, chum, and pink. In both Russia and Alaska, these fish provide an important source of subsistence, support recreation, and generate income to residents and tourists alike. The run of sockeye salmon in Bristol Bay is the largest in the world, with an average return over the past twenty years of nearly forty-five million fish. Many terrestrial species, such as brown bears along the coast of southwest Alaska, depend heavily on salmon for food. On the Kamchatka Peninsula (a sparsely populated area roughly two-thirds the size of California), hundreds of free-flowing rivers fill with salmon each year. Kamchatka's robust brown bear population, Steller sea eagles, and other wildlife are intricately tied to the Bering Sea by these salmon.

Forage fish such as herring (also of commercial importance), sandlance, capelin, and lanternfish are a critical part of the Bering Sea's biodiversity, supporting birds such as kittiwakes, gulls, terns, and marine mammals.

### **2.3.2iv Invertebrates of the Bering Sea (Map 6)**

For a northern sub-polar ecoregion, invertebrates are exceptional diverse in the Bering Sea. In areas such as the "Golden Triangle," the large marine area between the Pribilof Islands, Bogoslof Island and Izembek Lagoon (See Area #9 on Map 8, page A12), tidal mixing and ocean currents contribute to high levels of primary productivity, which in turn supports large concentrations of invertebrates such as squid. Similarly, in the western Bering Sea the nutrient-rich waters off the Kamchatka Peninsula support high numbers of zooplankton species. They, in turn, provide the basis for one of the most productive wildlife communities in the ecoregions, the Commander Islands, where representatives of North American and Asian marine benthos can be found. Among the commercially important invertebrate species of the Bering Sea are the crabs (king, tanner, and hair), and shrimp. The Korean hair crab is found primarily around the Pribilof Islands, while Tanner crabs range throughout the region. Bristol Bay historically has been rich in tanner, snow, and blue crabs.

One of the richest pockets of invertebrate life is found near St. Lawrence Island (See Area #12 on Map 6, page A9), where extremely productive benthic communities, including bivalve mollusks, and amphipods support a huge biomass of walruses, gray whales, and eiders during the year.

### **2.3.3 Step 3 – A Broader Strategy: Selecting Priority Areas for Conservation (Map 7)**

Having examined biodiversity within these four taxa, the next step was to consider areas of common value among the taxa. Maps from each of the four taxonomic groups were then combined to identify areas of concentration and importance common among all groups (See Map 7, page A11). Consideration also was given to habitat types and ecological processes needed for sustaining the biodiversity of these areas. Conservation priorities (ranks) were then set for each identified area within each subregion. Thus, these combined areas encompass sites where multiple taxa exist as well as the habitat and processes that sustain them (See Map 8, page A12). Detailed descriptions of these areas (Appendix B), including potential threats, conservation status, resources use and managing agencies were also compiled during the workshop using available literature and other sources identified by workshop participants.

## 2.4 Threat Assessment Summary

### **Process**

To better evaluate our potential for success in the areas highlighted as priorities for conservation, we asked participants to evaluate threats to Bering Sea biodiversity based upon their knowledge of the ecoregion. Individuals listed threats and then ranked them according to the following four criteria:

- Severity (the level of degradation in the area from the threat)
- Scope (the scale of the threat or how large the area that is currently or could be impacted)
- Duration (how long the impact of the threat will persist)
- Urgency (a measure of how soon action is needed to address the threat)

We then listed all of the highest ranked threats to Bering Sea biodiversity and grouped threats that were similar in nature (e.g. discarded rubbish and toxic contamination were both listed in the "pollution" category). We then asked participants to vote on the four most critical threats.

As a result of these votes, four factors were highlighted as the most critical threats to biodiversity in the Bering Sea:

- Mismanagement of fisheries
- Global climate change
- Alien species introductions
- Pollution

Subsequently, the experts broke into four groups to discuss these threats and possible strategies to reduce or address them.

The following threats are listed in order of rank as voted by participants in the experts' workshop. (For a summary of the discussion on possible strategies to mitigate these threats, please see Table 1 on page 16).

### **2.4.1 Fisheries Management**

This threat includes overfishing and overcapacity of the fleet, waste from bycatch, habitat destruction, benthic disturbance, poaching, bottom trawling, whaling, poor regulations, inappropriate subsistence harvest, drift nets, and inappropriate seasons for certain species. Mismanagement of the fishing industry within the Bering Sea was listed as a threat by 75% of the participants.

Fisheries mismanagement has received the most attention as a threat to Bering Sea resources in the past. Discussion of whether the depletion of some species is impacting the survival of other species is a topic of debate among researchers, the fishing industry and conservationists working on Bering Sea issues. Although the exact impact of fishing on specific fish stocks and mammal populations is still unclear, there are some facts that are clear.

For example:

- Fishing causes direct mortality to target fish species as well as other fish, mammals and birds through bycatch.
- Bottom trawling disturbs habitat structure and causes direct mortality to bottom dwelling fish, mollusks, corals, and other invertebrates (Jones 1992; Vining and Witherell 1997; Bergman and Hup 1992).
- Trawling leads to a large, rapid removal of biomass from critical areas of the Bering Sea.
- Fishing vessels carry rats, can spill oil and fuel, and are a source of nets and other debris known to cause direct mortality to birds and mammals.
- Fisheries policy development and regulation setting area heavily biased in favor of large commercial fishing interests.

**Table 1: Key Threats and Potential Abatement Strategies**

Source of Stress		Stress to Targets and Site Threat
<b>Fisheries Mismanagement</b>	<ul style="list-style-type: none"> <li>* Direct impact to and death of marine species</li> <li>* Disturbance of benthic environment</li> <li>* Excessive removals resulting in disruption to food web</li> <li>* Disturbance to biological community structure</li> <li>* Cumulative impact on species and communities through disruption of normal travel and distribution patterns</li> <li>* By-catch and waste of marine species</li> <li>* Sport harvest effects</li> <li>* Local extinction</li> </ul>	<ul style="list-style-type: none"> <li>* Conduct management in larger context to protect important habitat</li> <li>* Strengthen enforcement capabilities, particularly in Russia (observer programs, vessel tracking systems)</li> <li>* Develop better research and monitoring of long-term ecological effects</li> <li>* Stop destructive, short-term fishing/dredging practices in important areas</li> <li>* Improve catch reporting from Russian side of the Bering Sea</li> <li>* Compensate for the needs of birds and mammals in fisheries management decisions</li> </ul>
<b>Global Climate Change</b>	<ul style="list-style-type: none"> <li>* Warmer ocean temperatures</li> <li>* Changes in currents</li> <li>* Inundation of coastal habitat</li> <li>* Changes in ice edge</li> <li>* Changes in habitat structure due to changes in ice and snow structure in fall and spring</li> <li>* Alteration of prey movement within the Bering Sea.</li> <li>* Loss of near shore habitat due to hydrologic shifts</li> </ul>	<ul style="list-style-type: none"> <li>* Reduce greenhouse gas emissions globally</li> <li>* Protect representative marine reserves that allow for variation in water temperatures and climate change and the resulting movement of species</li> <li>* Raise public awareness about connections between Bering Sea and Lower 48 actions</li> </ul>
<b>Alien Species Introductions</b>	<ul style="list-style-type: none"> <li>* Competition, genetic pollution and disease from mariculture</li> <li>* Introduced organisms from bilge water and ballast pumping</li> <li>* Predation and disease from rats and mice accidentally introduced to islands</li> <li>* Predation and habitat destruction from purposeful introductions of foxes and ungulates</li> <li>* Accidental escaped aquaculture species</li> <li>* Stock transfers and loss of local genetic adaptations</li> </ul>	<ul style="list-style-type: none"> <li>* Discourage mariculture for wide-ranging species such as salmon</li> <li>* Use local seed stock for sessile invertebrates</li> <li>* Implement treatment of ballast water for microbes and other organisms</li> <li>* Encourage ballast pumping laws to avoid new introductions of species from other water bodies</li> <li>* Create harbor defense networks similar to Pribilofs</li> <li>* Establish shipwreck response teams near important sites</li> <li>* Work with shippers to reduce rats on ships</li> <li>* Remove rats from critical islands</li> <li>* Allow no new introductions</li> <li>* Remove foxes ground squirrels and other aliens from key sites</li> </ul>
<b>Pollution</b>	<ul style="list-style-type: none"> <li>* Plastic debris causing direct harm to species</li> <li>* Point source pollution from coastal cities causing poor water quality</li> <li>* Small gas and oil spills from shipping</li> <li>* Sedimentation and chemicals from mining causing direct harm to species</li> <li>* Nuclear-powered navigation lights (along the coast of Chukotka)</li> <li>* Atmospheric transportation of pollution</li> <li>* Contaminant bio-accumulation</li> </ul>	<ul style="list-style-type: none"> <li>* Firm solution on plastic debris</li> <li>* Inspection of vessels for safety measures</li> <li>* Safe transfer facilities</li> <li>* Location and remediation of military bases</li> <li>* International efforts to prevent oil, other spills</li> <li>* Collect more information on magnitude of pollution and impact on species</li> <li>* Increase education of general public on pollution issues</li> <li>* Promote international treaty to eliminate production of Persistent Organic Pollutants</li> </ul>

### **2.4.2 Anthropogenic Global Climate Change**

A number of sources indicate climate change is affecting life in the Bering Sea: the average surface temperature across Arctic Siberia, Alaska, and Northwestern Canada has risen about 1 degree Celsius during the last thirty years, exceeding the rate predicted for the greenhouse effect (Center for Global Change and Arctic Systems Research, 1998).

Other indicators such as thawing permafrost and melting glaciers (an estimated 80 percent of Alaska's glaciers are receding) support evidence of this dramatic change. The extent of sea ice in the Bering Sea has shrunk as much as 5 percent in the last thirty years.

Diminishing ice cover alone has vast implications for the region: declining abundance of micro-algae, primary producers in the food chain that have adapted to the Arctic seas by living in the ice itself or on the underside of ice; loss of critical habitat for polar bears, seals, walrus, and other marine mammals who depend on the ice edge environment for food and protection from predators; an increase in severe weather events such as the frequency and power of storm surges that cause coastal erosion and inundation; subsistence lifestyle changes as altered sea ice conditions make hunting on the ice more dangerous.

Scientists have already demonstrated a link between unusually warm water temperatures in the Bering Sea in 1997 and 1998 and altered ocean currents and atmospheric conditions, rare algae blooms, drastically low salmon runs, and extensive die-offs of seabirds. Research so far has yet to conclude whether these warm water changes are passing anomalies, such as those associated with El Nino, or whether they are indications of long-term, large-scale changes.

But given the present rate at which carbon dioxide is accumulating in the Earth's atmosphere, computer models predict that temperatures in high northern latitudes, including Alaska, could rise as much as 4 to 6 degrees Celsius (about 10 degrees Fahrenheit) in the next 80 to 100 years. The resulting physical changes would have repercussions throughout the world's oceans by influencing circulation patterns, climate, and the productivity of food chains, including valuable fisheries.

### **2.4.3 Alien Species Introductions**

The introduction of alien species such as rats, foxes, ungulates and marine organisms to the Bering Sea's islands and waters was, respectively, recognized to be one of the gravest threats to the local communities and native species populations. Girdwood workshop participants rated the prevention of alien introductions as one of highest priorities for action within the Bering Sea.

Alien species can have a devastating effect on biodiversity. In other marine regions, alien species traveling on ships' hulls, anchors, and in ballast water, have displaced and out-competed native species. Around the world, other regions have been adversely impacted by alien species, such as the Baltic Sea, where 60 introduced species have been found.

In an example closer to home, the rate of invasion into San Francisco Bay, is estimated to be one species every three to four months. One species that was introduced here is the green crab (*Carcinus maenas*), which has been steadily moving northward. It has been found in locations as far north as British Columbia, and poses a threat to Bering Sea's native crab species, such as dungeness crabs. Researchers are even beginning to find exotic marine species here in Alaska. Last year a survey of Kachemak Bay in Cook Inlet turned up several non-native invertebrate species within the vicinity of the Homer Spit.

Mariculture poses additional threats to biodiversity in the Bering Sea. Competition from non-native hatchery species could impact native species, and there may be some level of genetic pollution from non-native stocks of fish. Diseases introduced from mariculture could be another significant threat associated with mariculture.

Bilge water pumping could introduce microbial organisms and mussels into the Bering Sea that are not present now. Ballast water from ships moving into the Bering Sea from other regions often carries organisms not found in the Bering Sea. Once this water is released into the Bering, the organisms can

persist and out-compete native species. This has occurred in the Great Lakes area with zebra mussels and may have caused the lack of microbial diversity within the Barents Sea.

Accidental and intentional introductions of rats, foxes and dogs have had a serious impact on bird and small mammal diversity on Bering Sea Islands. The main cause of species declines has been predation by foxes: Arctic foxes were introduced to 78 islands in the Aleutian chain and red foxes were introduced to at least 20 islands in the 1800s and early in the 20th century. Although they have died out or been removed from many islands, they persist on many large islands today. Predation by rats and other introduced rodents and habitat destruction by introduced large mammals have also had serious local effects.

#### **2.4.4 Pollution**

In the Bering Sea, pollution includes impacts from spilled or discharged petroleum or fuel oils, heavy metals, PCBs, and other synthetic organic chemicals such as pesticides, nuclear wastes, plastics and other debris lost and dumped from ships, and lost and discarded fishing nets. Some of these chemical pollutants are being discovered in the tissues of marine mammals and indigenous peoples whose diet in many parts of the Bering Sea relies on fish and marine mammals. Elevated levels of contaminants have also been discovered and reported for marine birds and invertebrates (Estes et al., 1997, Bacon et al., 1999, Anthony et al., 1999)

Other sources of pollution include toxic waste sites and military remnants from World War II and the Cold War. For example, in the western Aleutian Islands the Adak Naval Air Station has been included by the Environmental Protection Agency on the National Priorities List as a hazardous substance site.

There were several recurring concerns regarding pollution as a threat to Bering Sea species. One of the most serious concerns was related to point source pollution from expired and now leaking nuclear generators on the Chukotka Peninsula. Once used to power a network of approximately 80 navigation lights along the Chukchi and Arctic seacoasts, the generators are outdated yet are no longer maintained by the Russian government. The generators are a major health and safety hazard. Additional sources of pollution are military wastes in the such as the sites on Adak and St. Lawrence Islands.

Transportation and associated pollution from discarded debris and minor oil or chemical spills is another critical threat. The presence of cargo vessels has dramatically increased within the Bering Sea as new shipping routes are established. Because of rough weather and ocean conditions, relatively small spills are frequent within this area. The recent push by the government of the Russian Federation to open a northern shipping route through the Bering Strait is especially alarming, considering the current weakened state of Russia's coast guard and law enforcement capabilities.

### ***2.5 Additional Issues of Concern***

Girdwood workshop participants discussed a number of other factors that threaten biodiversity in the Bering Sea, or that impede processes to resolve conservation issues. For instance, potential oil development in the ecoregion directly threatens marine organisms. Other problems include the lack of inclusion of Russian and Alaskan communities in planning and strategizing for conservation in the region.

#### **2.5.1 Oil Development**

Oil development, which includes exploration, development, transport, pipelines, and associated activities, represented a threat for a total of 10 participants who considered oil and the associated impacts on the Bering Sea area's landscape to be serious. The major threat in this case revolves around the potential for an oil spill and the destruction of habitat associated with oil exploration and production. Russian experts expressed apprehension about the proposed opening of a northern sea route through the Bering Strait, a move which would introduce many new sources of pollution from shipping traffic.

#### **2.5.2 Lack of involvement from the local community in resource management decisions**

One of the other issues articulated during the workshop was that the local communities of the Bering Sea have not been adequately consulted on decisions affecting the resources they rely on to live.

Local communities have noticed significant changes in species numbers and the extent of unique natural processes in the Bering. These opinions and insights are not always considered, consulted, or incorporated during planning and implementation of research or conservation. Unless the public around the Bering Sea is involved, unless the local communities have a stake in developing their own conservation goals and plans, as a collective conservation community, we will be able to make little progress.

### *2.6 Data Gaps and Necessary Research*

Another challenge to conservation in this ecoregion is the absence of a full understanding of how this dynamic natural system functions. For example, we still do not understand the links between human use and the status of wildlife and fisheries. We still lack sufficient information about particular species and species groups in the Bering Sea, such as benthic biodiversity patterns in the western Bering Sea. We have yet to understand how pollock utilize the entire Bering Sea, not only the Russian and U.S. Exclusive Economic Zones. Additional questions include the role species and processes in the basin play in the broader Bering Sea ecosystem; the abundance and importance of non-commercial fish and other species in the Bering Sea that have yet to be inventoried; the amount and kind of valuable physical and biological information contained in records of fisheries and oceanographic exploration in the Bering Sea by Russia and Japan in past decades that might help us understand changes of concern today.

◆ *Bering Sea ice pack*





## ***Part III: Beyond Maps, toward Conservation***

### *3.1 Lessons from Girdwood Workshop*

The Girdwood workshop helped to highlight not only the rich diversity of habitats across the immense expanse of the Bering Sea but the variety of factors which could or already do undermine biodiversity here. It is clear that in working on a scale as large as an ecoregion, and in addressing the variety of human activities in the Bering Sea, a combination of strategies will be necessary for biodiversity conservation. This mapping and prioritization exercise gives us a better understanding of where conservation strategies will be particularly important in the Bering Sea.

A strategy for biodiversity conservation should entail actions which help to conserve the full array of species, habitats, and processes in the Bering Sea. In some places it may be necessary to preserve some undisturbed, representative habitats that can serve as refugia for species and allow for restoration and resiliency. The conservation community is increasingly recognizing the value of marine protected areas as a tool for biodiversity conservation. (Table 2, page 20)

A portion of the workshop was devoted to a discussion of strategies that could be used to mitigate current and potential threats as well as more pro-active measures for conservation. Participants proposed a number of possible actions that could be taken in the near term (within the next five years) and over the long term (within the next fifty years) to address the major threats to biodiversity.

While discussing actions that are needed within the more immediate future, participants suggested measures that could be applied on the global scale (for example, reducing greenhouse gas emissions), the regional scale (aggressively preventing introductions of rats and other organisms to islands and waters of the Bering Sea), and the local scale, such as removing point sources of contaminants. (Table 1, page 15).

In considering how we can protect biodiversity over the long term, workshop participants hypothesized about creating a network of conservation areas which support critical Bering Sea ecosystems and processes. Working in small groups, participants theorized about how to create a range of areas that would meet conservation objectives in the ecoregion. Each team produced potential approaches, laying out a network of areas -- varying in size and status -- which might be given special status or conservation management strategies. The exercise was aimed more at facilitating a process for thinking about and discussing concepts for biodiversity conservation in this diverse and dynamic marine region than prescribing a specific plan for implementation.

The priority zones outlined in this report represent areas and processes which are significant for conservation of biodiversity and may be important as core protected areas in future proposals. Indeed the information here is intended to provide guidance for conservation strategies in the future.

One strategy to be considered is the creation of marine "safety areas," conservation areas, or low intensity use areas. These areas can take a variety of forms. Most importantly, these areas are designated for three major purposes: 1) to provide a refuge and buffer zone for populations; 2) to allow for a sufficient abundance and diversity of resources needed by species; 3) to maintain intact and sensitive communities and 4) to enhance reproduction in exploited populations (Bohnsack, 1993, Hastings and Botsford, 1999). By setting aside populations of fish, marine conservation areas can help to ensure a secure spawning population even in a variable environment where estimating stock sizes is difficult. Such areas can protect species assemblages from the effects of fishing and other human activities. They can serve essentially as nursery grounds, propagating adult fish for spillover into exploited areas. Safety areas could be used as a preventative measure to mitigate against population losses, or to reverse the trend in declining species. The areas might be designated "subsistence use only" zones, where traditional and customary uses of marine resources would continue while intensive commercial exploitation would be limited.

**Table 2: A Tool for Protecting Our Marine Ecoregions**

One tool used to help conserve and restore marine ecosystem health and in many places used as an effective fisheries management tool is the marine protected area (MPA). The goals of marine protected areas have been defined by the World Conservation Union (IUCN) and the World Wildlife Fund as:

- ★ To maintain the biodiversity and ecological processes of marine and coastal ecosystems
- ★ To ensure that any use of marine resources is both sustainable and equitable
- ★ To restore marine and coastal ecosystems where their functioning has been impaired

The main objective of most legally designated MPAs is biodiversity conservation, including protection or restoration of depleted populations, endangered species, and critical habitats. However, MPAs also have other roles. Large, zoned, multiple-use areas can play a role in reducing conflict between different uses of the marine environment. As human uses of the environment expand and intensify, the aims, definitions, and management approaches of MPAs are becoming increasingly flexible.

The experience of the conservation community has provided some important lessons that will be important to consider as the concept of MPAs is discussed in the Bering Sea:

1. MPAs must be tailored to local conditions, attitudes, and needs, and designed to achieve specific objectives, which should evolve according to changing circumstances if necessary.
2. Stakeholders must be involved at all stages of MPA planning and management.
3. MPAs need a sound legal basis.
4. All MPAs need a management plan.
5. Local communities have a role in enforcing MPAs.
6. MPAs require sufficient, well-trained personnel.
7. MPAs must be financially sustainable.
8. MPAs management effectiveness should be monitored and evaluated.

(This text has been taken from Marine Protected Areas: WWF's Role in their Future Development. WWF International Discussion Document. 1998)

For example, such a conservation strategy might be particularly desirable in regions of the Bering Sea where local people are concerned about declines in fish. The creation of a "safety" area if planned according to a given species' biological patterns and movements, could help fish populations to be replenish themselves. Increasingly scientists are noting that setting aside such areas can be beneficial to marine species. Not far from the Bering Sea in Puget Sound, for example, the creation of a marine park, Edmonds Underwater Park, twenty years ago has proven successful today in securing healthy lingcod and rockfish to populations. Around the world, communities are gaining positive experience with marine protected areas, learning that this tool can be beneficial to enhancing the long-term viability of their resources and environment.

Networks of protected areas may consist of permanent low intensity use zones around critical biodiversity conservation areas such as keystone islands or highly intact habitats. Such areas could be complemented with temporary "safety" areas that are opened and closed in important biodiversity areas at different times of the year or under particular conditions. These could be strategically located based on known patterns of species movements and resource availability, or adjusted to current conditions of biophysical parameters such as sea ice extent. Temporary safety areas may be useful in providing buffers for species and populations in the predictably variable temperature, ice, and productivity conditions of the Bering Sea.

We recognize that much more work is needed to identify the appropriate scale and target of such a network in the Bering Sea. Indeed, the requirements of scale and design of special conservation areas will likely vary among species groups.

Additionally, in order to catalyze the creation of marine protected areas in the Bering Sea, public support will be needed. Education, outreach, and public participation in planning and discussions on this subject will be critical to building such support.

The priority areas highlighted here should serve to help the public to understand and further discuss areas where important biodiversity values are present. Additionally the report should serve as a conceptual framework around which a variety of conservation programs can be built. For instance, within the priority areas certain features such as critical species aggregations may require special attention, whether in the form of temporal protection, or with designation of a buffer zone around them. Some of the priority areas may require management alternatives, for instance a decrease in extraction activities such as oil exploration during seasonal occurrences such as whale migrations. Other alternatives also might include subsistence-only areas, where local communities were involved in managing areas for subsistence use. In other words, the priority areas shown on this map indicate areas where higher standards for human activities should be applied if we are to maintain the biodiversity in the Bering Sea.

### *3.2 Next Steps*

With a better understanding of the key areas and processes supporting biodiversity in the Bering Sea, The Nature Conservancy of Alaska and the World Wildlife Fund will proceed in developing their respective conservation programs. Working with each other as well as with local, regional and other national partners, TNC and WWF envision the development of more refined action plans for particular areas highlighted within this report. Additionally, we will work with international partners to address ecoregional and global issues that affect biodiversity beyond these areas. We believe that in order to make progress in preserving the long-term viability of the Bering Sea the conservation community – defined in the broadest sense to include communities and resource users must join forces to develop an ecoregion-wide action plan. This plan will serve as a strategy setting forth goals and targets, the methods to achieve them, and the players who will be engaged in working toward these goals.

TNC and WWF will continue to work with communities and partners to begin focusing on some of the priorities and to address some of the threats identified in the workshop. We are both committed to this region, and hope to encourage many other players who will commit funds, expertise, and

support for efforts in the Bering Sea. In summary form below, we present the plans of our organizations in this ecoregion:

### 3.3 *The Nature Conservancy and the Bering Sea*

With over eight years of involvement in conservation in the Bering Sea, The Nature Conservancy of Alaska realizes the importance of working collaboratively with diverse partners towards shared conservation goals. With that in mind we have decided to build on lessons we have learned to implement a two pronged approach to our future work in the Bering Sea:

- We will first focus our efforts on ecoregional planning to define the important sites where we will deepen our conservation involvement.
- We will then work with local partners to abate critical threats at 2 to 5 sites within the Bering Sea over the next 10 years.

Conservation staff will further refine the ecoregional priorities identified in the Girdwood expert workshop. By early winter, 1999, we will refine our priorities and better evaluate how well priority sites meet the conservation goals for species and communities in the Bering Sea. Preliminary work indicates that TNC will initially (within five years) invest in abating key threats on the Pribilof Islands, Alaska Peninsula Lagoons, and in several aquatic sites associated with Bristol Bay. Future site-based strategies (over 10 years) may be initiated within the Bering Strait, on St Lawrence Island, the Commander Islands and the Yukon Delta.

With partners, the Conservancy will complete a site conservation plan for the Pribilof Islands. This will guide our work at that site and clarify how we can best support our local partner's work over the next five years. Possible strategies include:

- Helping to control exotic species introductions,
- conserving critical habitat, and
- building a strong conservation ethic among local youth through our support of the Pribilof Islands Stewardship Program

TNC will also complete an ecoregional plan for the Bristol Bay Lowlands that will further clarify site-based priorities within the terrestrial area of the Bristol Bay watershed.



Kevin Schafer

◆ *Red-faced cormorant*

### 3.4 *WWF and the Bering Sea*

WWF is committed to working with partners throughout the Bering Sea ecoregion to promote and implement conservation action on the ground. To date we have supported a number of projects in both the eastern and western Bering Sea that have helped us to become better acquainted with the region.

We will continue to pursue the following overarching goals in the ecoregion:

- Conserve the Bering Sea's unique and rich marine and coastal ecosystems;
- Raise awareness about the ecoregion and threats facing it, and build public support for Bering Sea conservation;
- Improve stewardship of Bering Sea resources;
- Work with partners to develop a comprehensive conservation strategy.

WWF works at the international, ecoregional, and local scales in the Bering Sea. Our program has several components, the goals of which are listed in the bullet points below.

### **1. Addressing Global Threats to Biodiversity**

#### **(a) Toxics and Contaminants**

- Promote UNEP-sponsored treaty to eliminate Persistent Organic Pollutants (POPs) such as PCBs and dioxins that are harmful to wildlife and people
- Provide technical and financial support to community-based monitoring projects designed and implemented by local people

#### **(b) Climate Change:**

- Reverse the trend of increasing greenhouse gas emissions in industrialized nations by increasing energy efficiency and accelerating the transition away from coal and oil towards renewable forms of energy such as wind and solar power.
- Raise public awareness on the national level about links between consumer behavior and effects in the Bering Sea.

#### **(c) Marine and Fisheries**

- Promote implementation of the Magnuson-Stevens Fisheries Conservation Act, particularly in habitat protection and by-catch reduction
- Support and promote efforts to improve law enforcement of fisheries regulations in Russia
- Facilitate community involvement in fisheries conservation
- Work with communities to build support for marine protected areas

### **2. Develop education and outreach programs**

- Provide support for Bering Sea educators through workshops on biodiversity, curriculum development and partnerships with educational institutions
- Increase national awareness about the Bering Sea through mass media
- Support two-way information flow to and from coastal communities through bulletins and radio programs such as "Alaska Coastal Currents"

### **3. Support species conservation and research, including**

- Efforts to prevent and/or eradicate non-native species such as the Norway rat
- Community monitoring networks, including a walrus haul-out monitoring program in Chukotka (Russia) and
- Through partnerships with local organizations and agencies to monitor declines in species such as the sea otter

In May of 1999, WWF's Russia Program Office convened a meeting of 60 marine biologists, representatives from NGOs and government agencies from the Russian Far East. Together they have developed a comprehensive strategy to address conservation goals in the Seas of Japan and Okhotsk and in the Bering Sea. In general Russia's marine program will be active in the following areas:

- Development of marine protected areas
- Conservation of species of special concern
- Legislation: promoting a legal framework to support marine biodiversity conservation
- Sustainable economies
- Environmental Education
- Preventing and reducing impacts of industrial development and pollution

In the western Bering Sea, WWF has already developed strong partnerships with several organizations including the Russian Association for Indigenous Peoples of the North, the Chukotka Society for

Marine Mammal Hunters, the Fund for Pacific Salmon, Kamchatrybvod, the Kaira Club, scientists from the Chukotka branch of the Pacific Scientific Research Fisheries Center, and the Department of Protected Areas in Russia's Committee for Environmental Protection.

Through small grants WWF is supporting projects in environmental education, public awareness, protected areas planning, collection of traditional knowledge, and a field guide to marine birds and fish of the Russian Far East. In a project jointly funded by WWF and the US Fish and Wildlife Service, a network of Russian Native hunters are working with biologists in a program to monitor walrus populations. Other partners in our Russian projects include the Wild Salmon Center, and the Pacific Environment and Resources Center

In the coming year we will support further development of conservation planning and action in Chukotka, the Autonomous Region of Koryakia (particularly in the Karaginsky Bay area), the coastal areas of the Kamchatka Peninsula, and the Commander Islands. All of these areas are shown on Map 8 in the Appendices.

### *Conclusion*

The compilation of data provided during the Girdwood workshop represents an important step in the effort to conserve biodiversity in the Bering Sea. This report is the second edition of a report that was reviewed by many of the Girdwood workshop participants. These experts provided invaluable comments, edits, and additional information which has enhanced the entire publication. The information has already been useful to WWF and TNC as we further develop our respective programs in the Bering Sea ecoregion. We hope that this document will also be useful to other organizations and individuals who share these goals and will serve to catalyze their interest in and support for conservation in the ecoregion.

We are committed to making this information available to the larger public, and more importantly, to promoting conservation action in the region. We believe that in order to achieve success in achieving this vision for the Bering Sea we must work with many partners – communities, research institutes, resource managers and resource users. We invite others to join in our efforts to conserve one of the world's most important seas and its resources for the future.



Dave Cline

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# *Appendices*

## **A. Maps 1-9**

- 1 Bering Sea Ecoregion
- 2 Subregions of the Bering Sea
- 3 Priority Bird Areas
- 4 Priority Mammal Areas
- 5 Priority Fish Areas
- 6 Priority Invertebrate Areas
- 7 Overlapping Priority Areas for all Taxa
- 8 Priority Areas for Bering Sea Biodiversity
- 9 Existing Protected Areas of the Bering Sea

## **B. Priority Area Descriptions**

## **C. Literature Cited in Appendix B**

## **D. List of Participants in the Girdwood Workshop on Bering Sea Biodiversity, March 20-23, 1999**

# Appendix A:

Maps from Girdwood Workshop, March 20-23, 1999  
and Priority Area Descriptions

**Maps 1-9**

1	Bering Sea Ecoregion	Inside Front Cover
2	Subregions of the Bering Sea	A2
3	Priority Bird Areas	A3
4	Priority Mammal Areas	A5
5	Priority Fish Areas	A7
6	Priority Invertebrate Areas	A9
7	Overlapping Priority Areas for all Taxa	A11
8	Priority Areas for Bering Sea Biodiversity	A12
9	Federal and State Managed Areas of the Bering Sea	A13



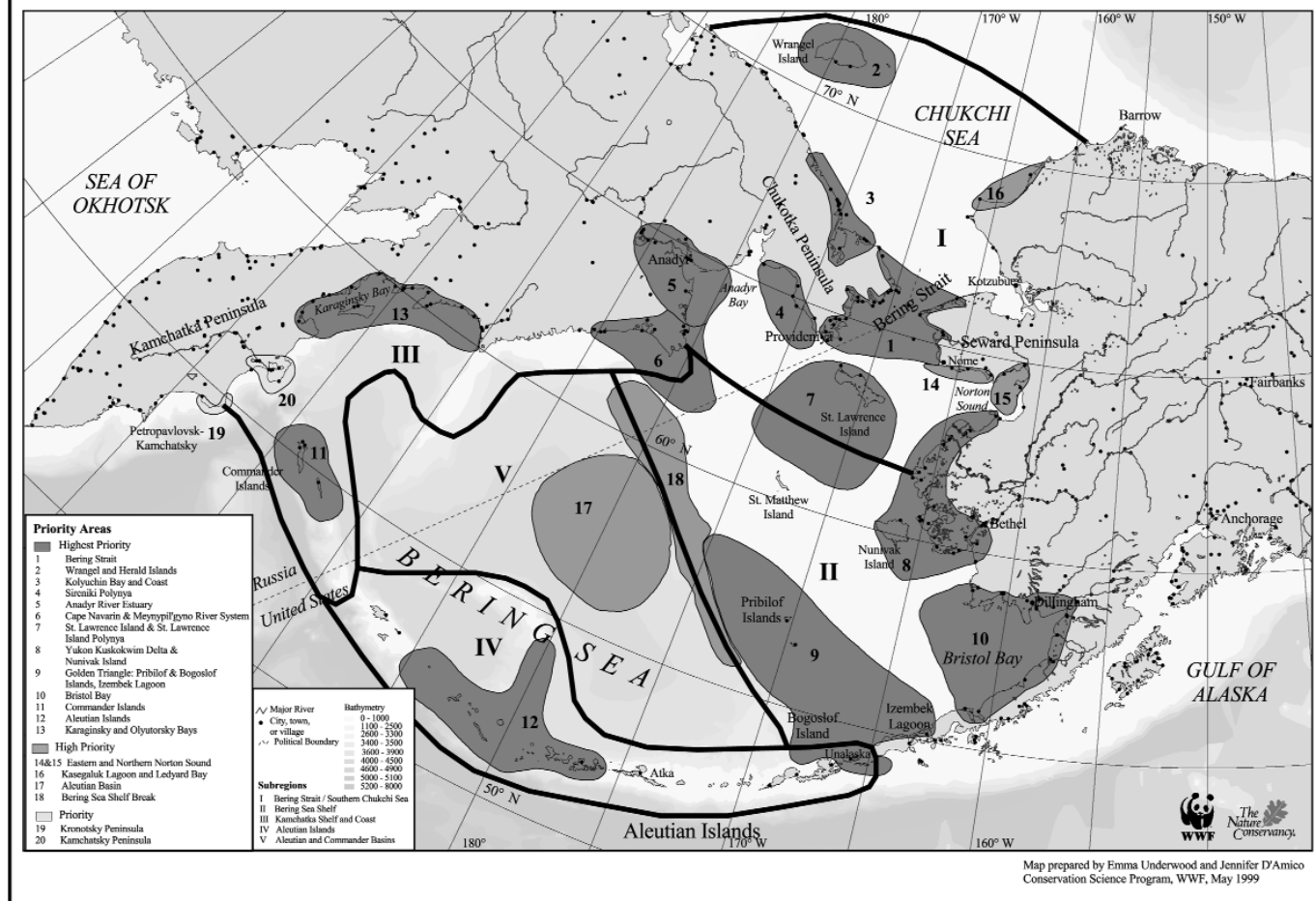
McGill Adams



# Appendix B:

## Description of Priority Areas

Map 8: BERING SEA ECOREGION: PRIORITY AREAS



### I. Highest Priority Areas

Map

ID #	Area Name	Page #
1	Bering Strait	B2
2	Wrangel and Herald Islands	B4
3	Kolyuchin Bay and Coast	B6
4	Sireniki Polynya	B7
5	Anadyr River Estuary	B8
6	Cape Navarin and Meynypil'gyno River System	B9
7	St. Lawrence Island	B10
8	Yukon-Kuskokwim Delta and Nunivak Island	B12
9	Golden Triangle	B13
10	Bristol Bay	B16
11	Commander Islands	B18
12	Aleutian Islands	B20
13	Karaginsky and Olyutorsky Bays	B21

## Area Descriptions

**Name:** Bering Strait

**Map ID number:** 1

**Subregion I:** Bering Strait/Southern Chukchi Sea

**Location:** Ocean and coastal areas north of St. Lawrence Island, Alaska between the eastern edge of the Chukotka Peninsula, Russia and the western edge of the Seward Peninsula, Alaska.

**Approximate Size:** 69,009 km<sup>2</sup>

**Ownership:** Russian Federation and the United States



**Description of area:** The Bering Strait is a 85 km-wide ocean pass between the Chukotka Peninsula, Russia and the Seward Peninsula, Alaska that connects the North Pacific Ocean and Bering Sea to the Chukchi Sea and Arctic Ocean. The bathymetry of the area is a smooth underwater shelf, averaging less than 40 m in depth (Sharma 1977). Sea ice covers the area for 6 to 7 months out of the year. The Bering Strait provides the only connection and exchange of water between the Pacific and Atlantic Oceans in the northern hemisphere. Mean northward transport of water, and thus nutrients through Bering Strait is the result of a sea level difference between the Bering Sea and Arctic Ocean. Two ocean currents (the Anadyr Stream of the northwestern Bering Sea and the Alaskan Coastal Current in the northeastern Bering Sea) flow northward through the Bering Strait (Coachman et al. 1975). Coastal waters of the eastern side near Alaska originate on the shallow southeastern shelf and are relatively warm with low salinity. Waters of the western side, along the coast of Russia originate in deep oceanic water at the edge of the continental shelf and is cold and of higher salinity. Coastal areas on both sides of the strait are composed of cliffs, mountains, shorelines, bays, river deltas, lagoons and estuarine systems. Eelgrass (*Zostera marina*), an important habitat and food item for numerous invertebrate and vertebrate marine species (Orth 1992) is found within several of the coastal lagoon areas. Big and Little Diomed Islands, belonging to Russia and the U.S. respectively, are situated within the Bering Strait and are rocky islands with numerous cliffs and sparse vegetation.

**Outstanding Biological Features:** A dominant feature of the Bering Sea ecoregion is the ice pack, which covers the Bering Strait for 6 to 7 months of the year. The seasonal spatial and temporal dynamic of the pack ice (over 1,700 km from the Arctic Ocean in summer to the Alaska Peninsula in winter, with high interannual variability in advance, extent, and retreat) (Niebauer 1980), is important in determining wildlife distribution, migration routes and feeding areas within the Bering Strait. Ice conditions affect the timing of spring melt and initiation of plant growth of coastal terrestrial areas. The pack ice edge possesses a significant abundance of micro-algae, which contributes to annual primary production during the spring ice-edge bloom. Typically, this is a small proportion of the total annual production (McRoy and Goering 1974). However, because cold water temperatures in spring preclude the development of herbivorous zooplankton populations, the bulk of the ice-edge primary production sinks to the bottom and is incorporated into benthic food webs (Coyle and Cooney 1988).

Concentrated nutrients carried in the flow of oceanic water from the shelf edge southeast of Cape Navarin (Priority area #6 – see Map 8, page A12), north around the Gulf of Anadyr, and through western Bering Strait (the Anadyr Stream) fuel the highest levels of primary production in the Bering Sea, and indeed some of the highest levels anywhere in the world (Springer et al. 1993). This prolific summer-long bloom of phytoplankton has a vastly greater role in the regional production budget than does primary production at the receding ice edge. The Anadyr Stream also advects a huge biomass of zooplankton onto the northern shelf that provides a major energy source to a diversity of species (Springer et al. 1989). According to Coyle et al. (1996), all four faunistic groups of zooplankton (comprising up to 56 species) that exist within the Bering Sea, are found within Bering Strait. In spite of their diversity and abundance, they are unable to control the prodigious phytoplankton production or biomass, and a heavy

rain of phytodetritus to the bottom leads to highly productive benthic invertebrate communities in the Bering Strait region that are critical to many marine birds and mammals (Grebmeier et al. 1988a).

The Bering Strait is a focal point for the migration and summer foraging of thousands of migratory birds. Many migrate through the Bering Strait from wintering grounds in the Americas, Asia, and Europe to breed in arctic regions. Large numbers of sea ducks, such as the spectacled eider (*Somateria fischeri*), threatened in North America, undergo their annual flightless molt within Mechigmentskaya Bay, along the eastern coast of the Chukotka Peninsula (Petersen et al. 1999a). Numerous seabirds nest on cliffs along both Russian and U.S. coasts and on the Diomed Islands. Konyukhov et al. (1999) estimated that nearly 3.3 million seabirds nest on the eastern coast of the Chukotka peninsula and estimates of breeding seabirds on the Diomed Islands approach 2 million (Hunt et al. 1981a). Breeding seabirds species of Bering Strait include the common (*Uria aalge*) and thick-billed (*U. lomvia*) murre, black-legged kittiwake (*Rissa tridactyla*), parakeet (*Cyclorhynchus psittacula*), crested (*Aethia cristatella*), and least (*Aethia pusilla*) auklet, tufted (*Lunda cirrhata*), and horned (*Fratercula corniculata*) puffin, northern fulmar (*Fulmarus glacialis*), pelagic cormorant (*Phalacrocorax pelagicus*), herring gull (*Larus argentatus*) and glaucous gull (*Larus hyperboreus*).

The Bering Strait is also a major migratory pathway and summer foraging and breeding area for marine mammals (Sobolevsky and Mathisen 1996). Gray whales (*Eschrichtius robustus*) and Pacific walrus (*Odobenus rosmarus*) depend on the productive benthic communities to support their populations. Bowhead whales (*Balaena mysticetus*) migrate north in the spring with the retreating ice pack through Bering Strait to summer feeding grounds in the Beaufort Sea. Other whales, such as the beluga (*Delphinapterus leucas*), minke (*Balaenoptera acutorostrata*), killer (*Orcinus orca*), and humpback (*Megaptera novaeangliae*) also occur in the area. Ice-associated seals, the spotted (*Phoca largha*), ringed (*P. hispida*), ribbon (*P. fasciata*), and bearded (*Erignathus barbatus*) seals; Steller sea lion (*Eumetopias jubatus*), and polar bear (*Ursus maritimus*) are found along the pack ice edge during the year and use the pack ice as a foraging and breeding area.

**Current Conservation Status:** Approximately 1.12 million hectares of coastal and interior areas north of Nome on the Seward Peninsula (Bering Land Bridge National Preserve) and north of Kotzebue, Alaska (Cape Krusenstern National Monument, Kobuk Valley National Park, and Noatak National Preserve) are managed by the National Park Service. However, most of the marine communities are not protected. The managed areas are proposed to be included within an international park and preserve that would include a comparable terrestrial area on Russia's Chukotka Peninsula. A marine buffer zone is also proposed for the Russian side of the preserve. At this time, feasibility studies are still underway for designating the Russian portion of the preserve and it is unlikely that a marine component of this system will be included.

On the western coast of the Bering Strait, the regional Beringia Ethnological-Natural Park, established in 1993 by local authorities, encompasses more than three million hectares. Russia's Arakamchechin Island, on the eastern coast of the Chukotka Peninsula, world-class walrus haul-out areas receive some protection from the regional government. Big Diomed Island is a Russian border post and as human activity is limited, it may therefore receive some incidental protection by the military.

**Current Resource Use:** Russian and Alaska natives rely on terrestrial and marine mammals for subsistence. In Alaska and Chukotka, marine mammals such as the bowhead whale, beluga whale, walrus, bearded seal, and spotted seal are taken by subsistence hunters (Stoker and Krupnik 1993, Small and DeMaster 1995). Native commercial fishing for salmon and crab takes place in Alaska, but locations and species of subsistence and commercial harvest in Russia is not known.

**Description of Threats:** Disturbance or pollution could arise from transportation traffic through the Bering Strait and along a new northern sea route which has been proposed by the Russian government.

Oil and gas exploration of Russian coastal areas near the Gulf of Anadyr, southwest of the Bering Strait, has been proposed in recent years (Newell et al. 1999). The release of oil or other pollutants from coastal processing of oil could cause impacts to biological resources (Khlebovich 1994, Melnikov et al. 1994). Accidental introduction of rats to islands or coastal areas from shipping traffic, either by running aground off shore or regular port docking, would have drastic consequences for seabirds as most nest in colonies and lay only one or two eggs each year. Global climate change could alter the distribution of pack ice in the Bering Strait area and disrupt biological processes that take place at the ice edge or influence the ice as a habitat for numerous species.

**Conservation and Management Agencies:** Union of Marine Mammal Hunters, Alaska Eskimo Whaling Commission, Alaska Nanuuq Commission, Union of Marine Mammal Hunters, U.S. National Park Service, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Goskomchukotekologia (Chukotka Government Ecological Committee), Pacific Institute of Geography (Vladivostok), the Far Eastern Branch of the Russian Academy of Sciences (Magadan and Vladivostok), TINRO (Pacific Research Institute of Fisheries and Oceanography), Kaira Club, Government of the Chukotka Autonomous Region

**Area Description Contributors:** S. Belikov, V. Byrd, A. Golovkin, Y. Gerasimov, J. Grebmeier, M. Petersen, R. Small, G. Smirnov, A. Springer

**Information Sources:** U.S. National Park Service, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Goskomchukotekologia (Chukotka Government Ecological Committee), Pacific Institute of Geography (Vladivostok, Russia), the Far Eastern Branch of the Russian Academy of Sciences (Magadan and Vladivostok, Russia).

**Name:** Wrangel and Herald Islands

**Map ID Number:** 2

**Subregion I:** Bering Strait/Southern Chukchi Sea

**Location:** An area that extends west from the northeast tip of the Chukotka Peninsula (western Bering Strait) to Cape Schmidt and north to Wrangel and Herald Islands.

**Approximate Size:** 38,507 km<sup>2</sup> and 40,729 km<sup>2</sup> respectively

**Ownership:** Russian Federation



**Description of area:** Wrangel Island (approximately 796,000 hectares) is located 170 km north of the Chukotka Peninsula, northwest of the Bering Strait. The entire island and a twenty-five mile marine zone surrounding it comprise one of Russia's Arctic nature reserves. This federally designated area is known as a Zapovednik, or strict scientific nature reserve. The island is divided latitudinally by a range of mountains that rise to 1,100 m, with an average elevation of about 500 m. To the north lies an extensive tundra and wetland complex known as the Tundra Academy that gently slopes to the sea. The tundra to the south of the mountains is drier, narrower, and higher in elevation, but includes the island's largest lake, Jack London Lake. The perimeter of the island consists of a series of coastal spits and barrier islands (Ward et al. 1993). The much smaller Herald Island (approximately 12 km<sup>2</sup>) is situated 60 km north-east of Wrangel Island. It consists of granite and gneiss mountains that rise to 364 m. The only vegetation on the island is patchy alpine tundra above the rocky coastal cliffs. Wrangel and Herald islands are surrounded by pack ice for most of the year and only briefly in late summer does the ice cover around the islands become sparse (Ovsyanikov 1996).

**Outstanding Biological Features:** Isolated off the north coast of the Chukotka Peninsula, Wrangel and Herald Islands are home to a vast diversity of plant and animal species. Over 380 species of plants have been recorded on the islands and several are found nowhere else in the world and believed to be relics from the time of the Bering Land bridge (10,000 to 12,000 years ago). Recent radiocarbon data suggests that woolly mammoths (*Mammuthus primigenius*) existed on Wrangel Island as recently as 4,000 to 7,500 years ago (Vartanyan 1995). One unique aspect of the island is the composition of species that are representative of distant regions, such as the steppes of Mongolia and Central Asia. The island boasts a number of endemic species, too: 24 vascular plants, 16 insects, and 2 lemmings (one of which is a subspecies) are endemic.

Fifty species of birds nest on Wrangel Island. A major breeding colony of snow geese (*Chen caerulescens*) is located on the island (Bousfield and Syroechkovskiy 1985, Cooch et al. 1995), as well as several Pacific black brant (*Branta bernicla*) (Ward et al. 1993). Thousands of black brant fly to Wrangel Island in late summer from North American breeding grounds to undergo a period of flightless molt. Approximately 500,000 seabirds, comprising eight species, nest on the islands. The large number of seabirds points to a rich abundance of marine fish and invertebrate life in the ocean surrounding the islands.

Nearly 80% of Bering and Chukchi Sea populations of breeding female polar bears (*Ursus maritimus*) den and give birth to cubs on Wrangel and Herald islands (Ovsyanikov 1996). The area is also a hunting area for polar bears during winter since some of the highest densities of ringed (*Phoca hispida*) and bearded (*Erignathus barbatus*) seals are found on the islands. Nearly half the world's population of Pacific walrus (*Odobenus rosmarus divergens*) (over 100,000 animals) use the island for foraging and raising their offspring during summer months. Bowhead (*Balaena mysticetus*) and gray (*Eschrichtius robustus*) whales are found in the Chukchi Sea around Wrangel Island. These whales also occur with humpback whales (*Megaptera novaeangliae*) along the northern coast of the Chukotka Peninsula. The northern coast of the Chukotka Peninsula contains numerous coastal lowlands of tundra and wetlands used by breeding and migrating shorebirds and waterfowl. Polar bears use coastal mountains for denning and the area is a migratory and summer and fall feeding area for walrus, seals, whales, and seabirds.

**Current Conservation Status:** Wrangel and Herald Islands are designated as a strict nature reserve (zapovednik) currently administered by the Department of Protected Areas of the federal Committee of Environmental Protection of Russia. The protected area also includes a 25-50 km marine buffer zone around the islands. While protected on paper, Wrangel Island's remote location makes it an extremely expensive and difficult area to manage. Russia's economic crisis in the last several years has nearly crippled the country's nature reserve system which is in great need of technical and financial assistance. The Chukotka Coast has little formal protection.

**Current Resource Use:** Resource use is prohibited within the area of the Wrangel Island Nature Reserve (Zapovednik). Locations and species of subsistence and commercial harvest along the northern Chukotka coast is not known.

**Description of Threats:** Disturbance or pollution from transportation traffic through the Bering Strait and possibly along a newly proposed northern sea route (see Khlebovich 1994, Melnikov et al. 1994). Global climate change could alter the distribution of pack ice in the Bering Strait area and disrupt biological processes that take place at the ice edge or influence the ice as a habitat for numerous species.

**Conservation and Management Agencies:** Wrangel Island Reserve, Russian Institute of Nature and Conservation, Goskomchukotekologia (Chukotka Government Ecological Committee), the Far Eastern Branch of the Russian Academy of Sciences (Magadan and Vladivostok), Government of the Chukotka

Autonomous Region

**Area Description Contributors:** S. Belikov, D. Cline, A. Golovkin, M. Petersen, S. Schliebe

**Information Sources:** Wrangel Island Reserve

**Name:** Kolyuchin Bay and Coast

**Map ID Number:** 3

**Subregion I:** Bering Strait/Southern Chukchi Sea

**Location:** An area that extends west from the northeast tip of the Chukotka Peninsula (western Bering Strait) to Cape Schmidt and north to Wrangel and Herald Islands.

**Approximate Size:** 69,009 km<sup>2</sup>

**Ownership:** Russian Federation



**Description of area:** This is an area that encompasses the Kolyuchin Bay on the northern coast of Chukotka, an enclosed bay protected by a series of spits and barrier islands. The highlighted area extends northwest along the coast of Chukotka, including marine and coastal habitats.

**Outstanding Biological Features:** This area is significant for its contributions of key habitat that support avian life in the Bering Sea. It is equally important for marine mammals. Kolyuchin Bay in particular is a site of importance for breeding, migrating and moulting waterfowl and shorebirds. It is one of only two sites in Russia where emperor geese (*Chen canagica*) are known to breed. The coastal area is rich in marine mammal life, fed by the nutrient-rich Anadyr Stream, which fuels prodigious primary production and also transports large volumes of zooplankton to the area. The coastal area is a key part of the migration route and foraging area of a number of cetacean species, particularly the bowhead whale (*Balaena mysticetus*), as well as lesser numbers of fin (Balaena physalus) and humpback (*Megaptera novaeangliae*) whales. Killer whales (*Orcinus orca*) are common and even narwhals (*Monodon monocerus*) appear on occasion. In summer, gray whales (*Eschrichtius robustus*) and belugas (*Delphinapterus leucas*) are abundant. On shore, some of the Bering Sea's highest concentrations of ringed seals (*Phoca hispida*) are found along with other seals.

**Conservation Status:** None

**Description of Threats:** Threats to the region include the possible opening of a northern shipping route, which would increase marine traffic and associated human activities along the shore, including oil pollution.

**Current Resource Use:** Unknown

**Relevant Conservation or Management Agencies:** Goskomchukotekologia (Chukotka Government Ecological Committee), the Far Eastern Branch of the Russian Academy of Sciences (Magadan and Vladivostok), ChukotNIRO (Chukotka Branch of the Pacific Research Institute of Fisheries and Oceanography)

**Area Description Contributors:** A. Golovkin, Y. Gerasimov, S. Belikov, A. Springer

**Name:** Sireniki Polynya

**Map ID Number:** 4

**Subregion I:** Bering Strait/Southern Chukchi Sea

**Location:** An open water, offshore area south and west of the village of Sireniki along the south side of the Chukotka Peninsula.

**Approximate Size:** 22,511 km<sup>2</sup>

**Ownership:** Russian Federation



**Description of area:** A coastal ice-free area in winter, this polynya is created by prevalent northerly winds (Smith et al. 1990). Located along the northeastern coast of the Gulf of Anadyr, the polynya extends westwards from St. Lawrence Island, Alaska to Meechkin Spit at the southern portion of Krest Bay, Russia. The area is biologically diverse and abundant during all times of the year primarily because of the Anadyr Stream that sweeps nutrients and plankton into the area. As a result, the area provides abundant primary and secondary production, which feeds populations of higher trophic species, such as fish, marine mammals, and sea ducks.

**Outstanding Biological Features:** An area of outstanding species abundance throughout the year. In winter months, thousands of birds, such as common murre (*Uria aalge*), glaucous gulls (*Larus hyperboreus*), oldsquaw (*Clangula hyemalis*), eiders (*Somateria spp.*), including spectacled eiders (*S. fischeri*) congregate in the forage-rich waters of the polynya. Pacific walrus (*Odobenus rosmarus divergens*) are found here, also, in winter. In spring, fall and winter, many beluga whales (*Delphinapterus leucas*) can be found here.

In summer months the area is very important for the Anadyr population of Pacific walrus. Two coastal areas in this section of the Gulf of Anadyr (Meechkin Spit and Rudder Spit) form the only large haul-outs and breeding areas for Pacific walrus in the entire Bering Sea. These populations may be non-migratory and thus part of an isolated population during summer and winter (G. Smirnov, pers. comm.). Ringed seal (*P. hispida*), spotted seal (*P. largha*), bearded seal (*Erignathus barbatus*), gray whale (*Eschrichtius robustus*), bowhead whale (*Balaena mysticetus*), and beluga whale use the area as a breeding and foraging site as well as a migratory corridor to the Bering Strait. More rare, but occasionally sighted are the humpback whale (*Megaptera novaeangliae*) and fin whale (*Balaenoptera physalus*). Colonies of breeding seabirds cover the cliffs and total numbers of birds exceeds a million (Konyukov et al. 1999).

**Current Conservation Status:** None.

**Current Resource Use:** The commercial fish harvest for this area is rather limited. In 1993-1995, a small-scale fishery (two-three vessels) was open for Polar cod and capelin, however conditions were variable and the fishery was unsuccessful. The total annual harvest here did not exceed 63 thousand tons on the Anadyr Gulf area.

**Description of Threats:** Disturbance or pollution from transportation traffic through the Bering Strait (see threats described for Wrangel Island, above) could result if and when the northern sea route is opened. Oil and gas exploration of Russian coastal areas near the Gulf of Anadyr, upstream from Sireniki Polynya, has been proposed in recent years (Newell et al. 1999). The release of oil or other pollutants from coastal processing of oil could cause impacts to biological resources (see Khlebovich 1994, Melnikov et al. 1994). There is concern that pollution from now-decrepit nuclear reactors that were established to power navigation lights along the coast of Russia are being released into the environment. Global climate change could disrupt the distribution of pack ice in the Bering Strait area and disrupt biological processes that take place at the ice edge or influence the ice as a habitat for numerous

species. Unregulated hunting, overfishing and entanglement of marine mammals in ocean debris are continual concerns in this area.

**Relevant Conservation and Management Agencies:** Kaira Club, Goskomchukotekologia (Chukotka Government Ecological Committee), the Far Eastern Branch of the Russian Academy of Sciences (Magadan and Vladivostok), ChukotNIRO (Chukotka Branch of the Pacific Research Institute of Fisheries and Oceanography)

**Area Description Contributors:** S. Belikov, A. Golovkin, G. Smirnov, A. Springer, V. Radchenko

**Information Sources:** Kaira Club (Chukotka), Goskomchukotekologia (Chukotka Government Ecological Committee), the Far Eastern Branch of the Russian Academy of Sciences (Magadan and Vladivostok), Pacific Scientific Research Fisheries Center (TINRO-Center)

**Name:** Anadyr River Estuary

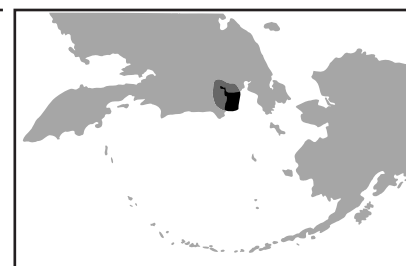
**Map ID Number:** 5

**Subregion I:** Bering Strait/Southern Chukchi Sea

**Location:** A large estuary and bay in northeastern Russia near the capital city of Anadyr.

**Approximate Size:** 45,198 km<sup>2</sup>

**Ownership:** Russian Federation



**Description of area:** The lower reaches of the Anadyr River are a dense network of river channels, and marine wetlands, comprising a rich estuary system that supports abundant wildlife. Vegetation is characteristic of coastal marine wetlands with areas of shrub, tussock, upland, and polygonal tundra further interior (Newell et al. 1999).

**Outstanding Biological Features:** Waterfowl and shorebirds are particularly numerous in the Lower Anadyr Delta. Large numbers of Pacific black brant (*Branta bernicla*), white-fronted geese (*Anser albifrons*), and emperor geese (*Chen canagica*), are found in the area. (Petersen et al. 1994). In fact, the area is one of the main nesting areas in Russia for the species. The Anadyr River is a spawning area for salmon (*Oncorhynchus spp.*) and large numbers of capelin (*Mallotus villosus socialis*) (Naumenko 1996).

**Current Conservation Status:** Four special purpose preserves (zakazniks) are located within the Anadyr River estuary. The total area is 1,050 km<sup>2</sup> of terrestrial habitat and 33,700 km<sup>2</sup> of marine habitat. However, as a rule, zakazniks are not particularly well-enforced, especially with current budget cuts in the Russian environmental field. Zakazniks have no permanent staff; they are typically the management responsibility of the local game management department. Large expanses of territory identified within this priority area currently have no designation whatsoever for conservation.

**Current Resource Use:** The lower Anadyr River area is the most highly populated region of Chukotka, with a population of 8,000 in Anadyr, the capital of the region, and some 6,000 people living in surrounding villages. The largest commercial harvest of fish in Chukotka occurs in this area. Primary targets of the fishery are salmonid species: chum salmon (*Oncorhynchus keta*) pink salmon (*Oncorhynchus gorbuscha*), silver salmon (*Oncorhynchus kisutch*) and *Salvelinus alpinus*. Smelt (*Osmerus sp.*) and whitefish (*Coregonus sp.*) are also fished commercially here. Additionally, the area sees intensive sport hunting of waterfowl in the spring. (The chum fishery is only conducted in this area by beach and river seine with an annual harvest of 11,200 to 37,000 tons in 1990s).

**Description of Threats:** Pollution from the town of Anadyr (pop. 8,000) appears to be the most likely threat currently. According to the National Research Council (1996), all sewage waste from Anadyr was dumped directly to the sea without treatment. Pollution from mining operations along interior section of the Anadyr River could also cause harmful discharge. Oil and gas exploration of Russian coastal areas near the Gulf of Anadyr, southwest of the Bering Strait, has been proposed in recent years (Newell et al. 1999). The release of oil or other pollutants from coastal processing of oil could cause impacts to biological resources (see Khlebovich 1994, Melnikov et al. 1994). Disturbance or pollution from transportation traffic through the Bering Strait and along the northern sea route (estimated at 1,000 vessels annually) is a potential. Global climate change could disrupt the distribution of pack ice in the Bering Strait area and disrupt biological processes that take place at the ice edge or influence tidal flows and thus vegetation and forage patterns for coastal species.

**Relevant Conservation and Management Agencies:** Naukan Association of Natives, Kaira Club (Chukotka), Union of Marine Mammal Hunters, Goskomchukotekologia (Chukotka Government Ecological Committee), TINRO (Pacific Research Institute of Fisheries and Oceanography), Kamchatrybvod, the Far Eastern Branch of the Russian Academy of Sciences (Magadan and Vladivostok), Government of the Chukotka Autonomous Region

**Area Description Contributors:** S. Belikov, G. Smirnov, V. Radchenko

**Information Sources:** Goskomchukotekologia (Chukotka Government Ecological Committee), the Far Eastern Branch of the Russian Academy of Sciences (Magadan and Vladivostok), Government of the Chukotka Autonomous Region

**Name:** Cape Navarin and Meynypil'gyno River System

**Map ID Number:** 6

**Subregion III:** Kamchatka Shelf and Coast

**Location:** Cape Navarin is approximately 200 km south of the mouth of the Anadyr River. Meynypil'gyno Lagoon is approximately 100 km west of Cape Navarin.

**Approximate Size:** 27,840

**Ownership:** Russian Federation



**Outstanding Biological Features:** The Anadyr Stream current that flows past Cape Navarin, is highly productive as a result of nutrient cycling and ocean upwelling from deep water areas along the Bering Sea continental shelf (Springer et al. 1993, 1996). This nutrient-rich current flows into and out of the Gulf and creates a very productive ocean area that supports great numbers of pelagic and benthic fauna (Springer et al. 1996). From Cape Navarin south to Cape Olyutorsk, ocean bottom temperatures are 0.5—3.0 °C colder than inner regions of the Gulf of Karaginskiy. Circulation brings nutrients from these cold water reservoirs up to the uppermost layers where photosynthesis takes place. This process contributes to high levels of primary and secondary production and elevated biomass of phytoplankton and zooplankton (Springer et al. 1996).

Cape Navarin is the site of one of the largest seabird colonies in northeastern Russia. Predominant marine life in the area includes the gray whale (*Eschrichtius robustus*), killer whale (*Orcinus orca*), hump-back whale (*Megaptera novaeangliae*), and fin whale (*Balaenoptera physalis*) (Sobolevsky and Mathisen 1996). Bowhead whales (*Balena mysticetus*) over winter in the area and beluga whales (*Delphinapterus leucas*) migrate through the area in conjunction with seasonal movements of the ice pack. Ice-associated seals [ringed (*Phoca hispida*), spotted (*P. largha*), ribbon (*P. rasciata*) and bearded (*Erignathus barbatus*)]

breed in the area. Haul-outs of Pacific walrus (*Odobenus rosmarus*) and Steller sea lion (*Eumetopias jubatus*) are found along the coast. Pacific walrus and beluga whales (*Delphinapterus leucas*) are found in the area during winter.

Meynypil'gyno Lagoon is a lake and riverine system of coastal wetlands. Numerous species of waterfowl and shorebirds nest in the area. Sockeye salmon (*Oncorhynchus nerka*) spawn in the rivers. Large numbers of beluga whales spend the winter near Meynypil'gyno Lagoon, as do smaller numbers of bowhead whale, Pacific walrus, and seals.

**Current Conservation Status:** No special protection measures are in place for Cape Navarin and the Meynypil'gyno River System.

**Current Resource Use:** A commercial fishery for sockeye salmon, pollock, cod and other groundfish is located in adjacent waters.

**Description of Threats:** Pollution from the town of Anadyr (pop. 8,000-12,000) appears to be the most likely threat currently. According to the National Research Council (1996), all sewage waste from Anadyr was dumped directly to the sea without treatment. Pollution from mining operations along interior section of the Anadyr River could also cause harmful discharge. Oil and gas exploration of Russian coastal areas near the Gulf of Anadyr, southwest of the Bering Strait, has been proposed in recent years (Newell et al. 1999). The release of oil or other pollutants from coastal processing of oil could cause impacts to biological resources (see Khlebovich 1994, Melnikov et al. 1994). Disturbance or pollution from transportation traffic through Bering Strait and along the northern sea route (estimated at 1,000 vessels annually) is a potential. Global climate change could disrupt the distribution of pack ice in the Bering Strait area and disrupt biological processes that take place at the ice edge or influence tidal and thus vegetation and forage patterns for coastal species.

**Relevant Conservation and Management Agencies:** Naukan Association of Natives, Kaira Club (Chukotka), Union of Marine Mammal Hunters, Goskomchukotekologia (Chukotka Government Ecological Committee), TINRO (Pacific Research Institute of Fisheries and Oceanography), Kamchatrybvod, the Far Eastern Branch of the Russian Academy of Sciences (Magadan and Vladivostok), Government of the Chukotka Autonomous Region

**Area Description Contributors:** S. Belikov, G. Smirnov

**Information Sources:** Goskomchukotekologia (Chukotka Government Ecological Committee), the Far Eastern Branch of the Russian Academy of Sciences (Magadan and Vladivostok), Government of the Chukotka Autonomous Region

**Name:** St. Lawrence Island

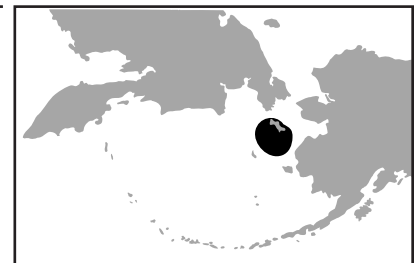
**Map ID number:** 7

**Subregion I:** Bering Strait/Southern Chukchi Sea

**Location:** South of the Bering Strait in the northern Bering Sea.

**Approximate Size:** 106,437 km<sup>2</sup>

**Ownership:** Sivuqaq Native Corporation



**Description of area:** St. Lawrence island is a landmass of 2,000 square miles. As a result of its position and historic contact with both Asia and North America during the time of the Bering Land Bridge, flora and fauna of the island is particular to both palearctic and nearctic regions. Biotic communities are similar to mainland areas, but are somewhat modified due to the isolation.

tion of the island and its unique climate (Fay and Cade, 1959). Tundra vegetation is the predominant type and most plants grow very close to the ground due to the high and frequent winds. The vast majority of wildlife, primarily birds, is concentrated along the coast where sea cliffs and talus hillsides provide nesting habitat for seabirds and shallow near shore areas form marine foraging habitat for sea ducks.

**Outstanding Biological Features:** Ocean areas surrounding the island exhibit high concentrations of benthic invertebrates, including bivalve mollusks (*Nuclea radiata*, *N. buloti*, and *Macoma calcaria*), polychaetes, amphipod communities, blue king crabs (*Paralithodes platypus*), and snow crabs (*Chionoecetes opilio*) (Grebmeier et al. 1988a, b, Grebmeier and Cooper 1995). The area hosts a large concentration of halibut (*Hippoglossus stenolepis*). Ocean areas around St. Lawrence are also important foraging sites for wintering and breeding Pacific walrus (*Odobenus rosmarus*), ice-associated seals [spotted (*Phoca largha*), ringed (*P. hispida*), and ribbon (*P. fasciata*), and bearded (*Erignathus barbatus*)], and bowhead (*Balaena mysticetus*), beluga (*Delphinapterus leucas*), minke (*Balaenoptera acutorostrata*), and gray (*Eschrichtius robustus*) whales.

South of St. Lawrence Island, ice free areas associated with the St. Lawrence Island polynya provide winter habitat for the spectacled eider (*Somateria fischeri*), a threatened sea duck in North America (Petersen et al. 1999a). During the winter, these sea ducks forage on rich benthic invertebrate communities, primarily bivalves, at depths that may exceed 40 m (Petersen et al. 1999b). King (*S. spectabilis*) and common (*S. mollissima*) eiders and oldsquaw (*Clangula hyemalis*) are found along the southern coast of St. Lawrence Island during summer months and in open water areas along the pack ice edge in winter. Polar bears (*Ursus maritimus*) hunt in these areas during the winter. In the spring and fall, the island is in a major migration corridor for birds and marine mammals.

Approximately 2.7 million seabirds breed on St. Lawrence Island (Hunt et al. 1981a, Fay and Cade 1959). Species include the pelagic cormorant (*Phalacrocorax pelagicus*), glaucous gull (*Larus hyperboreus*), black-legged kittiwake (*Rissa tridactyla*), common (*Uria aalge*) and thick-billed (*U. lomvia*) murre, pigeon guillemot (*Cephus columba*), parakeet (*Cyclorhynchus psittacula*), crested (*Aethia cristatella*) and least (*A. pusilla*) auklets, as well as horned (*Fratercula corniculata*) and tufted (*Lunda cirrhata*) puffin.

**Current Conservation Status:** None.

**Current Resource Use:** Subsistence hunting by village residents of Gambell and Savoonga for whales, walrus, seabirds, and waterfowl.

**Description of Threats:** An old U.S. military site on the northeast cape of St. Lawrence Island (approximately 9 square miles) contains at least 23 contaminated sites. According to contractors for the Army Corps of Engineers, these sites require environmental investigation and cleanup. Contamination includes fuel spills totaling over 220,000 gallons, solvents, heavy metals, dioxins and furans, asbestos, and PCBs. One of the several barrel dumps contains approximately 29,500 drums (Alaska Community Action on Toxics, Anchorage, Alaska). Oil and gas exploration of Russian coastal areas near the Gulf of Anadyr, southwest of the Bering Strait, has been proposed in recent years (Newell et al. 1999). The release of oil or other pollutants from coastal processing of oil could cause impacts to biological resources (see Khlebovich 1994, Melnikov et al. 1994). There is also a potential for spills of radionuclides from Russian nuclear generators used to power navigation lights along the coast of the Chukotka Peninsula. Global climate change could disrupt the distribution of pack ice in the Bering Strait area and disrupt biological processes that take place at the ice edge or influence the ice as a habitat for numerous species.

**Relevant Conservation and Management Agencies:** Sivuqaq Native Corporation, U.S. Fish and Wildlife Service, Eskimo Walrus and Whaling Commissions, Alaska Nanuuq Commission, Alaska Marine

**Area Description Contributors:** C. Johnson, M. Petersen, J. Grebmeier, A. Springer

**Information Sources:** Sivuqaq Native Corporation, U.S. Fish and Wildlife Service, Alaska Community Action on Toxics

**Name:** Yukon-Kuskokwim Delta and Nunivak Island

**Map ID number:** 8

**Subregion II:** Bering Sea Shelf

**Location:** Along the west coast of Alaska in the eastern Bering Sea.

**Approximate Size:** 53,361 km<sup>2</sup>

**Ownership:** Native Corporations, the United States



**Description of area:** The Yukon and Kuskokwim Rivers meander through a vast expanse of treeless marsh and wetland that forms the Yukon-Kuskokwim Delta. Coastal vegetation is composed of salt tolerant marsh plants, whereas more interior areas are characterized by tundra and upland plant communities. Large tidal fluctuations near the coast, along with occasional storm tide surges, flood coastal areas with salt water creating invertebrate rich coastal marshes used by waterfowl and shorebirds. Nunivak Island, approximately 50 km southwest of the Yukon-Kuskokwim Delta comprises 445,000 hectares of coastal and interior wetland complexes and upland tundra with rocky sea cliffs along the coasts. The southern 243,000 hectares is designated as wilderness.

**Outstanding Biological Features:** The elaborate maze of lakes, ponds, and rivers that cover the Yukon-Kuskokwim Delta creates habitats for the largest concentrations of breeding waterfowl (King and Dau 1981) and shorebirds (Gill and Handel 1981) in North America. Over 20 species of waterfowl and 10 species of shorebirds breed on the delta. Common goose species include the Pacific black brant (*Branta bernicla*), white-fronted goose (*Anser fabalis*), cackling Canada goose (*Branta canadensis minima*), and the sole North American breeding population of the Bering Sea endemic emperor goose (*Chen canagica*). Diving duck species include the oldsquaw (*Clangula hyemalis*), scaup (*Aythya spp.*) common eider (*S. mollissima*), and the spectacled eider (*Somateria fischeri*), a threatened species in North America (Stehn et al. 1993, Ely et al. 1994). Dabbling ducks include northern pintail (*Anas acuta*), green-winged teal (*A. crecca*), and northern shoveler (*A. clypeata*).

Coastal littoral and wetland areas of the Yukon-Kuskokwim Delta are used by hundreds of thousands of migrating shorebirds during spring and fall (Gill and Handel 1981). Common breeding shorebird species include the black-bellied plover (*Pluvialis squatorola*), bar-tailed godwit (*Limosa lapponica*), ruddy (*Arenaria interpres*) and black (*A. melanocephala*) turnstone, red-necked phalarope (*Phalaropus lobatus*), long-billed dowitcher (*Limnodromus scolopaceus*), red knot (*Calidris canutus*), semipalmated sandpiper (*C. pusilla*), western sandpiper (*C. mauri*), and dunlin (*C. alpina*). Bearded (*Erignathus barbatus*) and harbor (*Phoca vitulina richardsi*) seals, Steller sea lions (*Eumetopias jubatus*), Pacific walrus (*Odobenus rosmarus divergens*), and beluga whales (*Delphinapterus leucas*) are found in coastal waters of the delta and occasionally near river mouths where they feed on salmon (*Oncorhynchus spp.*) and white fish (*Coregonus sp.*).

Nunivak Island supports introduced herds of muskox (*Ovibos moschatus*) and reindeer (*Rangifer tarandus*). The muskox herd is used as a breeding stock to establish herds elsewhere in Alaska and Russia. The reindeer herd is a major source of food and income for island residents. Approximately 85% of seabird colonies on Nunivak Island are comprised of common murre (*Uria aalge*) (Hunt et al. 1981a).

Other species include the black-legged kittwake (*Rissa tridactyla*), thick-billed murre (*U. lomvia*), pigeon guillemot (*Cepphus columba*), parakeet auklet (*Cyclorrhynchus psittacula*), pelagic cormorant (*Phalacrocorax pelagicus*), and horned puffin (*Fratercula corniculata*). The abundance of wildlife has made the Yukon-Kuskokwim Delta the heart of Yupik Eskimo culture for thousands of years. The delta encompasses 42 Eskimo villages whose residents depend on the coastal and interior wildlife resources of the area for subsistence.

**Current Conservation Status:** Although a large portion of this site falls within a National Wildlife Refuge, Native individuals or corporations own biologically significant tracts within the Refuge. The marine portion of this site is not in any formal conservation status.

**Current Resource Use:** Grazing activity by reindeer on the southern half of Nunivak Island began prior to Wilderness designation and will be allowed to continue as provided for in the Alaska National Interest Lands Conservation Act and the legislation designating these lands as Wilderness. Subsistence harvest of muskox occurs on Nunivak Island. Subsistence hunting of seals, migratory birds, and collection of plants occurs on Nunivak Island and on the Yukon-Kuskokwim Delta. Commercial and local subsistence fishing of salmon and white fish also takes place on the Yukon-Kuskokwim Delta.

**Description of Threats:** Heavy metal or radionuclide contamination can become incorporated into marine mammals, fish, and birds that are then caught and consumed by village populations (see Khlebovich 1994, Melnikov et al. 1994). Mismanagement of fisheries resources, upon which many seabirds, marine mammals, and native subsistence and commercial users depend, is of concern. Disturbance or pollution from transportation traffic through Bering Strait and from barge traffic along smaller rivers on the delta to access inland villages. Additionally, oil spills coincident with a storm surge tide in early fall could have drastic impacts to coastal habitats (Gill and Handel 1981). Lead poisoning of bottom feeding waterfowl comprises another threat.

**Relevant Conservation or Management Agencies:** Association of Village Council Presidents, Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, Clarence Rhode (Yukon Delta) National Wildlife Refuge

**Area Description Contributors:** C. Lensik, M. Petersen

**Information Sources:** Association of Village Council Presidents, Alaska Department of Fish and Game, National Marine Fisheries Service, U.S. Fish and Wildlife Service, University of Alaska, Fairbanks

**Name:** The Golden Triangle

**Map ID Number:** 9

**Subregion II:** Bering Sea Shelf

**Location:** A triangle-shaped area that encompasses areas in the Aleutian Islands, east of Bogoslof Island to Izembek Lagoon on the Alaska Peninsula and north to the Pribilof Islands.

**Approximate Size:** 202,474 km<sup>2</sup>. Within this area, Izembek National Wildlife Refuge encompasses 1.2 million hectares of land and water: Izembek Refuge (170,000 hectares); the Pavlof and North Creek Units of the Alaska Peninsula Refuge (610,000 hectares); and Unimak Island in the Alaska Maritime Refuge (400,000 hectares). Total area within the triangle of Bogoslof Island, Izembek Lagoon, and the Pribilof Islands is 202,474 km<sup>2</sup>.

**Ownership:** Coastal seabird colonies are managed by the U.S. Fish and Wildlife Service and are part of



the Alaska Maritime National Wildlife Refuge. Fur seal rookeries are managed by the National Marine Fisheries Service in cooperation with the Ecosystem Conservation Office of the Tribal Government of St. Paul. Remaining land is either owned by the State of Alaska or by Native Corporations.

**Description of area:** The ocean area within the Golden Triangle of Bogoslof Island, Izembek Lagoon, and the Pribilof Islands is situated at the southeast corner of the Bering Sea. This area is partitioned into biophysical domains that delineate habitats for many species. The ocean area within the Golden Triangle is unique in having four types of shelf domain within a limited space. These domains include the inner shelf (< 50 m in depth), the middle shelf (50-100 m in depth), the outer shelf (100 – 200 m in depth), and the continental slope (> 200 m in depth). Characteristics such as currents, temperature, salinity, timing of spring bloom, community structure of plankton, and carbon flux differ among these domains (Iverson et al. 1979, Cooney 1981, Walsh and McRoy 1986, Schumacher and Stabeno 1998, Springer et al. 1996). Part of the area can be covered by sea ice during winter months. The three points that comprise the Golden Triangle are described in the following paragraphs.

Bogoslof Island is a small (approximately 70 hectares and 100 m in elevation) rocky island 80 km west of Dutch Harbor, Alaska. The island was created during a suboceanic eruption in May of 1796 and has changed size and shape a number of times since it first rose out of the Bering Sea. Volcanic events have occurred at Bogoslof at least six times this century, including a major dome building event in the summer of 1992. The island now provides rocky cliff habitat for thousands of breeding seabirds and beaches for thousands of fur seals and hundreds of sea lions. The Aleutian North Slope Current bathes this region with Alaskan Stream water and then flows toward and then along the continental slope of the Golden Triangle (Stabeno et al., in press a Reed and Stabeno, in press). This current intimately links the biology along the Aleutian Islands to that of the outer shelf.

Izembek Lagoon contains one of the world's largest beds of eelgrass (*Zostera marina*), a marine grass that is an important substrate used by numerous invertebrate and vertebrate species during various life cycle stages. The landscape surrounding Izembek Lagoon includes volcanoes, glaciers, valleys, and tundra uplands sloping down to lagoons of the Bering Sea and North Pacific Ocean. The 370,000 hectare Unimak Island Wilderness comprises habitats that vary from low coastal wetlands to ice fields of the island's volcanic peaks. Much of the area is characterized by low-growing sedge and grass tundra, extensive ash flats and old lava flows, and permanent ice fields at the higher elevations. On the west side of Unimak Island is Unimak Pass, a 25 km ocean pass that is the first main entrance for North Pacific Ocean waters into the Bering Sea.

The Pribilof Islands (St. Paul, St. George, Walrus, and Otter) are located in the central Bering Sea 300 km north of the Aleutian Islands chain and 500 km west of the mainland. St. George has hills and ridges with steep cliffs rising up to 300 m, whereas St. Paul has a rolling plateau with some extinct volcanic peaks (National Research Council 1996). The islands are treeless and vegetation is comprised of tundra meadow communities. Waters from the continental slope interact with island bathymetry to create potentially trapped circulation around St Paul Island and also provide a source of nutrients and planktonic material (Stabeno et al, in press b).

**Outstanding Biological Features:** Bogoslof Island provides nesting habitat for nearly 100,000 seabirds, including red-legged kittiwakes (*Rissa brevirostris*), which breed at only four sites in the world—all in the Bering Sea (Byrd 1978). Bogoslof Island contains a rookery of threatened Steller sea lions (*Eumetopias jubatus*) and a rapidly growing breeding population of northern fur seals (*Callorhinus ursinus*).

The most outstanding feature of Izembek Lagoon is the large amount of eelgrass. Eelgrass is used as forage and a breeding and wintering habitat for numerous invertebrate and vertebrate species (Orth 1992). Izembek Lagoon is a critically important habitat for migrating and wintering waterfowl. Hundreds of thousands of waterfowl, including nearly the entire population of Pacific black brant geese (*Branta bernicla*), most of the world's emperor geese (*Chen canagica*), and the vast majority of the world's Pacific

population of Steller's eider, a threatened species in North America, use the lagoon during spring and fall migration. Black brant feed almost exclusively on eelgrass during the fall staging period before migrating to wintering areas on the Baja Peninsula of Mexico. Izembek Lagoon provides the final opportunity for many migrating shorebirds to feed and rest before their long over-water flights to wintering areas as far away as South America, Polynesia, and New Zealand. Numerous species of seabirds and marine mammals inhabit the surrounding marine environment. Harbor seals (*Phoca vitulina*) and sea otters (*Enhydra lutris*) frequent lagoon waters and congregate at haul-outs along sand and rock beaches. Steller sea lions are seen occasionally in the lagoon and use offshore rocky islands for haul-outs and rookeries. Gray (*Eschrichtius robustus*), killer (*Orcinus orca*), and minke (*Balaenoptera acutorostrata*) whales migrate along the coastline.

The Unimak Pass region is physically dynamic and highly productive. Immense numbers of shearwaters (*Puffinus* spp.) feed there in summer, and many other species of seabirds migrate through the area during spring and fall. This is also a major wintering area for auklets (*Cyclorhynchus* spp. and *Aethia* spp.).

The Pribilof Islands (and St. Matthew Island to the north) exhibit an extraordinary abundance and diversity of marine life (Hood and Calder 1983) as they comprise a rare island habitat, situated on the Bering Sea shelf. This location provides breeding space and access to a variety of feeding habitats, such as middle domain, outer domain, shelf-edge and oceanic. Seabird colonies on the islands are among the largest in the northern hemisphere, comprising nearly 2.5 million birds (Hunt et al., 1981a). Breeding colonies of more than one million thick-billed murre (*Uria lomvia*) occur here. Other breeding seabirds include the black-legged kittiwake (*Rissa tradactyla*), parakeet auklet (*Cyclorhynchus psittacula*), crested auklet (*Aethia cristatella*), least auklet (*Aethia pusilla*), northern fulmar, and red-faced cormorant (*Phalacrocorax urile*). Well over 80% of the world's population of the endemic red-legged kittiwake breeds on the Pribilof Islands (Byrd et al. 1997). Large numbers of short-tailed (*Puffinus tenuirostris*) and sooty (*P. griseus*) shearwaters forage in the area during summer months before returning to the southern hemisphere to breed during the austral summer (Hunt et al. 1981b). The Pribilof Islands are home to approximately 800,000 northern fur seals (*Callorhinus ursinus*), approximately 80% of the world's population (NMFS 1993). Large concentrations of blue king crab (*Paralithodes platypus*), snow crab (*Chionoecetes opilio*), and hair crab (*Erimacrus isenbeckii*) are found in offshore waters (National Research Council 1996).

Due to the presence of the four biophysical domains in the area, the Golden Triangle supports diverse assemblages of species. Furthermore, physical processes such as tidal mixing, eddy pumping, and currents contribute to high levels of primary and secondary production that support higher trophic levels (Springer et al. 1996). For instance, the concentration of squid (*Beryteuthis* spp. and *Gonatus* spp.) along the shelf edge attracts chinook salmon (*Oncorhynchus tshawytscha*), a squid specialist found along the shelf during the summer feeding period. A number of other species are attracted by the rich food source at the shelf edge and elsewhere in the region including the commercially valued walleye pollock (*Theragra chalcogramma*), Pacific Ocean perch (*Sebastes alutus*), Pacific cod (*Gadus macrocephalus*), sablefish (*Anoplopoma fimbria*), Greenland turbot (*Reinhardtius hippoglossoides*), arrowtooth flounder (*Atheresthes stomias*), Pacific halibut (*Hippoglossus stenolepis*), herring (*Clupea harengus*), and large concentrations of capelin (*Mallotus villosus*) (Naumenko 1996, National Research Council 1996, Springer et al. 1996). The shelf edge also plays a central role in the life cycle of marine mammals, such as northern fur seals and fin (*Balaenoptera physalus*) and sperm whales (*Physeter macrocephalus*). Like the chinook salmon, sperm whales are squid specialists and congregate at the shelf edge for feeding. Other whales, such as the blue (*Balaenoptera musculus*), minke (*B. acutorostrata*), Stejneger's beaked (*Mesoplodon stejnegeri*), and Dall's porpoise (*Phocoenoides dalli*) are also shelf edge species (Lowry et al. 1982).

**Current Conservation Status:** Bogoslof Island is a wilderness area within the Aleutians Islands unit of the Alaska Maritime National Wildlife Refuge. The majority of Unimak Island and Izembek National

Wildlife Refuge are designated as Wilderness. (The Izembek Wilderness area is 300,000 acres in area, while the Unimak Wilderness area is 910,000 acres). Izembek Lagoon and coastal wetlands are protected within the state-run Izembek Game Refuge, while the adjacent watershed is encompassed by the federally designated Izembek National Wildlife Refuge. Izembek Lagoon is also a Wetland of International Importance (Ramsar Convention). Rocky cliff areas of the Pribilof Islands are managed as the Bering Sea unit of the Alaska Maritime National Wildlife Refuge (U.S. Fish and Wildlife Service). Aiktak Island, a large seabird colony near Unimak Pass and other nearby islands are part of the Alaska Maritime NWR. There is no specific conservation designation within the marine area of the Golden Triangle. Many terrestrial areas with critical coastal habitat remain unprotected. Some of these areas are privately owned or could be subject to incompatible resource use.

**Current Resource Use:** Commercial fishing and crabbing operations are located around the Pribilof Islands. Other fisheries, based out of Dutch Harbor, Unalaska and Bristol Bay fish the area for salmon, halibut, pollock, and other groundfish. Subsistence use of seabirds, fur seals, sea lions and fish is important on the Pribilofs and elsewhere in the Golden Triangle area.

**Description of Threats:** Mismanagement of fisheries resources, upon which many seabirds, marine mammals, and native subsistence and commercial users depend, is of concern. Disturbance or pollution from transportation traffic through Unimak Pass, the terminus for the Alaska Peninsula and one of the first points of contact between the Bering Sea and Northern Gulf of Alaska. The U.S. Coast Guard estimated that 3,000-4,000 ships pass through Unimak Pass each year (Louis Berger and Associates 1984). Oil spills in any of these areas would have devastating impacts to wildlife habitats and fisheries resources. Accidental introduction of rats to Bogoslof Island or Pribilof Islands from shipping traffic, either by running aground off shore or regular port docking, would have drastic consequences for seabirds as most nest in colonies and lay only one or two eggs each year. Entanglement of marine mammals in ocean debris, especially for fur seals, is a continual concern.

**Relevant Conservation or Management Agencies:** Aleutian Islands East Borough, Pribilof Partners (King Cove, Alaska), National Marine Fisheries Service, U.S. Fish and Wildlife Service, Alaska Department of Fish and Game, Central Bering Fishermen's Association, Native Corporations, State of Alaska

**Area Description Contributors:** V. Byrd, M. Petersen, A. Sowls

**Important information Sources:** Izembek National Wildlife Refuge, Alaska Maritime National Wildlife Refuge

**Name:** Bristol Bay

**Map ID number:** 10

**Subregion II:** Bering Sea Shelf

**Location:** An ocean area in the eastern Bering Sea of southwestern Alaska. The area described here encompasses all areas north and east of Port Moller on the Alaska Peninsula, north and west to Cape Newenham.

**Approximate Size:** 98,716 km<sup>2</sup>

**Ownership:** U.S. Fish and Wildlife Service, State of Alaska, Native Corporations



**Description of area:** A large ocean area that contains two biophysical oceanic domains or habitats: the coastal domain (< 50 m in depth) and a middle shelf domain (50 – 100 m in depth). These domains

differ in regard to their currents, temperature, salinity, timing of spring bloom, community structure of plankton, and carbon flux (Schumacher and Stabeno, 1998). The break between these two domains winds its way along the north side of the Alaska Peninsula and through the central portion of Bristol Bay generally following the 50 m isobath (Schumacher et al. 1979). Much of Bristol Bay can be covered by sea ice during winter months. Bristol Bay is bordered to the north, west and south by often rugged, mountainous shorelines, as well as sand and gravel beaches, lagoons, estuaries, and river mouths. Hagemeister and Walrus Islands (approximately 60 and 20 square miles, respectively), are located in the northern portion of Bristol Bay. Coastal areas are vegetated by ryegrass (*Elymus spp.*), cotton grass (*Eriophorum spp.*), mosses, and succulents.

**Outstanding Biological Features:** Bristol Bay contains some of the largest populations of ground fish, crabs, and marine mammals in the world, especially in the eastern portion of the bay and along the north side of the Alaska Peninsula (Bakkala 1993). Large concentrations of sockeye salmon (*Oncorhynchus nerka*), walleye pollock (*Theragra chalcogramma*), Pacific cod (*Gadus macrocephalus*), Pacific halibut (*Hippoglossus stenolepis*), yellowfin sole (*Pleuronectes asper*), rock sole (*P. bilineatus*), and flathead sole (*Hippoglossoides elassodon*) are found in the area. Red king crab (*Paralithodes camtschatica*), tanner crab (*Chionoecetes bairdi*) and snow crab (*C. opilio*) are abundant.

Several haul-outs and breeding areas of Pacific walrus (*Odobenus rosmarus*) are located within the Bristol Bay region. These include those of the Round Island State Game Sanctuary near Togiak, Alaska. Spotted seals (*Phoca largha*) and six species of whale [beluga (*Delphinapterus leucas*), gray (*Eschrichtius robustus*), humpback (*Megaptera novaeangliae*), minke (*Balaenoptera acutorostrata*), and right (*Eubalaena glacialis*) whale] use the off-shore waters for migration and foraging (Lowry et al. 1982). Sea otters (*Enhydra lutris*) are also found in the area, especially in the coastal lagoons of the southern portion of Bristol Bay.

The large abundance and diversity of fish in the area is an important component to the Bristol Bay and eastern Bering Sea ecosystem as these fish provide forage for other fishes, marine mammals, and birds (Bakkala 1993). Coastal areas of Bristol Bay are used by breeding and migrating waterfowl and shorebirds returning from wintering areas in Russia, Japan, Mexico, South America, New Zealand, and the South Pacific. There are several seabird colonies scattered along coastal areas of Bristol Bay, such as Cape Newenham and Cape Peirce. Bristol Bay contains the only substantial colonies of double-crested cormorant (*Phalacrocorax auritus*) in the Bering Sea (Hunt et al. 1981a). Other breeding seabird species include the pelagic (*P. pelagicus*) and red-faced (*P. urile*) cormorant, glaucous-winged gull (*Larus glaucescens*), black-legged kittiwake (*Rissa tridactyla*), Aleutian tern (*Sterna aleutica*), common murre (*Uria aalge*), pigeon guillemot (*Cepphus columba*), parakeet auklet (*Cyclorrhynchus psittacula*), and horned (*Fratercula corniculata*) and tufted (*Lunda cirrhata*) puffin. Large numbers of short-tailed (*Puffinus tenuirostris*) and sooty (*P. griseus*) shearwaters forage in the area during summer months before returning to the southern hemisphere to breed during the austral summer (Hunt et al. 1981b). Coastal littoral and wetland areas of Bristol Bay are used by thousands of migrating shorebirds during spring and fall (Gill and Handel 1981). Common breeding shorebird species include the black turnstone (*Arenaria melanocephala*), western (*Calidris mauri*) and rock (*C. ptilocnemis*) sandpiper, and dunlin (*C. alpina*). Waterfowl, such as the emperor goose (*Chen canagica*), spend winter months in coastal lagoons. Large numbers of Steller's eiders (*Polysticta stelleri*), threatened in North America, undergo their annual flightless molt and spend the winter in lagoon areas along the north coast of the Alaska Peninsula. Canada geese (*Branta canadensis*), several species of dabbling duck, and songbirds also forage in coastal areas of Bristol Bay during spring and fall migration.

**Current Conservation Status:** Several coastal areas are within state or federal wildlife areas. These are the Togiak National Wildlife Refuge, Alaska Maritime National Wildlife Refuge, Alaska Peninsula National Wildlife Refuge, Cape Newenham State Game Refuge, Walrus Islands State Game Sanctuary, and the

State Critical Habitat Areas of Egegik, Pilot Point, Cinder River, Port Heiden, and Port Moller. Significant areas of private or non-conservation status lands exist within critical habitat, and there is little formal marine protection in this area.

**Current Resource Use:** Bristol Bay is home to the world's largest commercial sockeye salmon fishery, where 10 to 30 million sockeye salmon may be caught each year during only a few weeks time. Subsistence harvest of salmon and walrus (Fall et al. 1991) also takes place in the area. Harbor seals are also taken for subsistence.

**Description of Threats:** Mismanagement of fisheries resources, upon which many seabirds, marine mammals, and native subsistence and commercial users depend, is of concern. Oil spills in any of these areas would have devastating impacts to wildlife habitats and fisheries resources. There is also a potential for disturbance or pollution from transportation traffic through Unimak Pass, the terminus for the Alaska Peninsula and one of the first points of contact between the Bering Sea and Northern Gulf of Alaska. The U.S. Coast Guard estimated that 3,000-4,000 ships pass through Unimak Pass each year (Louis Berger and Associates 1984). Entanglement of marine mammals in ocean debris is a continual concern. Proposed commercial dredging for clams threatens bottom habitat in this area.

**Relevant Conservation and Management Agencies:** State of Alaska, Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Bristol Bay Native Association, Quassiq Walrus Commission

**Area Description Contributors:** V. Byrd, A. Sows, J. Grebmeier

**Information Sources:** Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, Bristol Bay Native Association, National Marine Fisheries Service

**Name:** Commander Islands

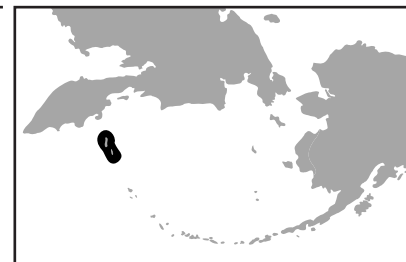
**Map ID Number:** 11

**Subregion III:** Kamchatka Shelf and Coast

**Location:** Situated approximately 125 miles (200 km) east of the Kamchatka Peninsula in the southwestern Bering Sea.

**Approximate Size:** 24,301 km<sup>2</sup>. The terrestrial area of Commander Islands Nature Reserve is 3,648,000 hectares; its marine protective zone (30 km zone around the islands) is 3,463,000 hectares.

**Ownership:** Russian Federation



**Description of area:** The Commander Islands (Bering, Medniy, and several smaller islands) are situated at the boundary between the Eurasian and North American continents and serve as a bridge for migrating species between these two continents. The area is therefore very diverse and interesting from a biogeographical standpoint. The islands are an above water portion of an underwater mountain ridge that rises nearly 4,000 m above the surrounding Kamchatka and Aleutian Basins. Several short and shallow rivers are located on the islands. Lakes are mostly of lagoon origin and there are no trees on the islands. Vegetation consists of upland tundra meadows and small bushes along the coasts. Nearly 500 species of plants have been identified on the islands (Newell et al. 1999).

**Outstanding Biological Features:** As a result of ocean upwelling from deep water areas of the surrounding Kamchatka and Aleutian basins, waters near the islands contain a rich diversity and abundance of invertebrate species. Coyle et al. (1996) found that ocean areas surrounding the Commander Islands

contained two distinct faunistic groups of zooplankton representing nearly 30 species.

Ocean areas surrounding the islands are feeding grounds for the humpback whale (*Megaptera novaeangliae*), fin whale (*Balaenoptera physalus*), sperm whale (*Physeter macrocephalus*), killer whale (*Orcinus orca*) (Sobolevsky and Mathisen 1996), sea otter (*Enhydra lutis*), and the threatened and declining Steller sea lion (*Eumetopias jubatus*) (Boltnev and Mathisen 1996). Steller sea lion rookeries are located in the area (National Marine Fisheries Service 1992). The islands contain approximately 15% of the world's breeding population of northern fur seal (*Callorhinus ursinus*) (National Marine Fisheries Service 1993).

Nearly 60 species of birds breed on the islands and several large seabird colonies are present. These include the horned puffin (*Fratercula corniculata*), common murre (*Uria aalge*), red-faced cormorant (*Phalacrocorax urile*), and the endemic red-legged kittiwake (*Rissa brevirostris*), which breeds at only four sites in the world—all in the Bering Sea (Byrd 1978). Wintering waterfowl are common and include the emperor goose (*Chen canagica*), Steller's eider (*Polysticta stelleri*), and oldsquaw (*Clangula hyemalis*). Five endemic subspecies of birds, including one marine subspecies of the ancient murrelet (*Synthliboramphus antiquus mycorrhynchos*) and the rock sandpiper (*Calidris ptilocnemis quarta*) (Tomkovich, 1987).

For a period of forty years, the shelf surrounding the Commander Islands was off limits to fishing. As a result of this lack of resource use, bottom communities have been little affected by commercial fisheries, particularly bottom trawling. The upper shelf is characterized by diverse macroalgal flora, which includes some 150 species. (Selivanova and Zhigadlova, 1997). Dense kelp forests of *Laminaria spp.* and *Alaria spp.* are found in the littoral zone. (Ivanjushina et al, 1991).

**Current Conservation Status:** A strict nature reserve (zapovednik) was established to incorporate the entire island group. This protective area includes a 30 mile zone around the islands for conservation of marine habitats. However, the reserve's protection regime is poorly enforced (see below). Poor communication capacity, lack of transportation, budget cuts by the federal government, loss of staff and deteriorating socioeconomic conditions on the islands are among some of the main obstacles to conservation.

**Current Resource Use:** There is an annual commercial harvest for northern fur seals on the island that consists of about 5,000 animals (Boltnev 1996). According to Newell et al. 1999, the economic collapse of the former Soviet Union has pushed local villagers to subsist on virtually every marine and terrestrial organism that occurs on Bering Island.

**Description of Threats:** Mismanagement of fisheries resources, upon which many seabirds, marine mammals, and native subsistence and commercial users depend, is of concern. Due to economic collapse of the former Soviet Union and resulting poverty in village communities, there is illegal harvest of just about every terrestrial and marine animal on the islands (Newell et al. 1999). Poaching by large and small fishing vessels within the rich waters of the protected marine zone is increasingly a problem, as the reserve staff has little capacity to address this pressure. Invasion by non-native species is another threat; currently 17 percent of the avifauna are alien species (Newell et al, 1999).

**Relevant Conservation and Management Agencies:** Kommandorsky Zapovednik, Kamchatrybvod (Kamchatka Territorial Board for the Preservation and Reproduction of Fish Resources and Regulation), Kamchatka Institute of Ecology and Natural Resources, Aleutian Pribilof Islands Association

**Area Description Contributors:** M. Williams, V. Burkanov

**Information Sources:** Kamchatrybvod (Kamchatka Territorial Board for the Preservation and Reproduction of Fish Resources and Regulation), Department of Nature Reserve Management of the Russian Federation's Committee on the Environment

Name: Aleutian Islands

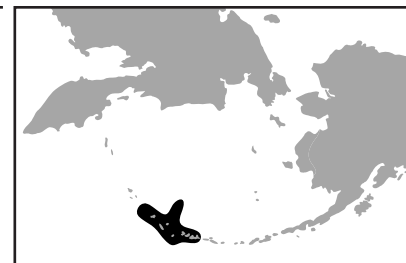
Map ID number: 12

Subregion IV: Aleutian Islands

Location: Eastern, Central, and Western Aleutian Islands from Attu Islands east to Unimak Island.

Approximate Size: 92,508 km<sup>2</sup>

Ownership: United States, State of Alaska, Aleut Native Corporations



**Description of area:** The Aleutian Islands are comprised of over 200 islands that total about 1.1 million hectares. Volcanic in origin, the Aleutian Islands continue to experience frequent volcanic and seismic activity. Fifty-seven volcanoes (13 over 1,500 m high) are visible in the chain and many are active. The chain of islands is 30-100 km wide and extends more than 1,800 km from Attu Island east to Unimak Island. Most of the islands are mountainous with numerous lakes, ponds, and streams. The flora is rich and diverse, with a mix of plants from both North America and Eurasia. Grasses, sedges, lichens, mosses, and heath plants cover the landscape. Large beds of kelp and eelgrass (*Zostera marina*), important habitats for many invertebrate and vertebrate species, are found along shorelines and within lagoons and bays.

**Outstanding biological features:** Few ocean areas are as productive as those surrounding the Aleutians. The Bering Sea's rich marine diversity is closely related to a phenomenon known as the Green Belt, a highly productive habitat along the edge of the continental shelf and throughout the Aleutian Arc (Springer et al. 1996). Processes of tidal mixing and circulation bring nutrients from reservoirs at greater depths up to the uppermost water layers where photosynthesis takes place. This process contributes to high levels of primary and secondary production and elevated biomass of phytoplankton and zooplankton (Springer et al. 1996).

The cold, turbulent waters of the Aleutian Islands produce some of the most abundant fishery stocks in the world. Walleye pollock (*Theragra chalcogramma*), Pacific Ocean perch (*Sebastes alutus*), Pacific herring (*Clupea harengus pallasii*), Pacific cod (*Gadus macrocephalus*), halibut (*Hippoglossus stenolepis*), pelagic and demersal rockfish (*Sebastes spp.*), Atka mackerel (*Pleurogrammus monopterygius*), and salmon (*Oncorhynchus spp.*) are plentiful. Dolly varden (*Salvelinus malma*) and salmon spawn in streams throughout the chain. Pink salmon are the most abundant, but chum, coho, and sockeye salmon are also found in the area.

The islands and coastal waters are home to many marine mammals, such as the harbor seal (*Phoca vitulina richardsi*), sperm whale (*Physeter macrocephalus*), Baird's beaked whale (*Berardius bairdii*), killer whale (*Orcinus orca*), Dall's porpoise (*Phocoenoides dalli*), and Stejneger's beaked whale (*Mesoplodon stejnegeri*) (Small and DeMaster 1995). Nearly half of Alaska's threatened Steller sea lion (*Eumetopias jubatus*) population is found in the Aleutian Islands. (Small and DeMaster 1995). Sea otters are abundant throughout the western and central Aleutians. Arctic (*Alopex lagopus*) and red (*Vulpes vulpes*) foxes are present on some islands after being introduced by Russian fur traders from the 1830s to the 1930s (Bailey 1993). However, due to severe depredation on breeding seabirds, many foxes have or are being removed from islands where they were introduced.

The Aleutian Islands are an important resting and feeding stop for many migratory birds. About 40% of Alaska's seabirds (about 10 million birds among 25 species) are found on the islands (U.S. Fish and Wildlife Service). Outstanding examples of seabird diversity and abundance are found on Buldir Island, which supports the most diverse seabird breeding area in the northern hemisphere (Byrd and Day 1986). Kiska Island contains the largest auklet colony in the southern Bering Sea. Some birds also winter almost exclusively throughout the Aleutian Islands, such as the whiskered auklet (*Aethia pygmaea*), and the emperor goose (*Chen canagica*).

Besides the threatened Steller sea lion, two additional endemic species of concern occur along the Aleutian Islands. The threatened Aleutian Canada goose (*Branta canadensis leucopareia*) breeds on fewer than five islands (U.S. Fish and Wildlife Service 1991) and the endangered Aleutian shield-fern (*Polystichum aleuticum*) is found only on Adak Island. Though some are of debatable classification, several endemic subspecies have been identified throughout the Aleutian Islands, such as the green-winged teal (*Anas crecca nimia*), rock sandpiper (*Calidris ptilonemis couesi*), rock ptarmigan (*Lagopus mutus* spp.), winter wren (*Troglodytes troglodytes* spp.), song sparrow (*Melospiza melodia maxima*), and rosy finch (*Leucosticte arctoa* spp.). The majority of the world's population of whiskered auklets (*Aethia pygmaea*) occurs in the Aleutian Islands.

**Current Conservation status:** Commercial fishing occurs in the area for bottom fish, but is prohibited near sea lion rookeries. Much of the land mass is designated for conservation purposes. About 610,000 hectares of the Aleutian Islands are designated as wilderness and much of this area is also within the Alaska Maritime National Wildlife Refuge.

**Current Resource Use:** Commercial fishing and native subsistence harvest.

**Description of threats:** Accidental introduction of rats to Aleutian Islands from shipping traffic, either by running aground off shore or regular port docking, would have drastic consequences for seabirds as most nest in colonies and lay only one or two eggs each year. Entanglement of marine mammals in ocean debris is a continual concern. Mismanagement of fisheries resources, upon which many seabirds, marine mammals, and native subsistence and commercial users depend, is of concern. Predation by introduced foxes continues to limit seabirds and land birds on many islands.

**Relevant Conservation or Management Agencies:** U.S. Fish and Wildlife Service, National Marine Fisheries Service, Alaska Department of Fish and Game, Aleut Native Corporations

**Area Description Contributors:** V. Byrd, A. Springer, A. Sows

**Information Sources:** U.S. Fish and Wildlife Service, National Marine Fisheries Service, Alaska Department of Fish and Game, Aleut Native Corporations

**Name:** Karaginsky and Olyutorsky Bays

**Map ID number:** 13

**Subregion III:** Kamchatka Shelf and Coast

**Location:** Approximately 50 km east of the northeastern portion of the Kamchatka Peninsula.

**Approximate Size:** 200,000 hectares

**Ownership:** Russian Federation



**Description of area:** The area encompasses the waters and coast of the northern Kamchatka Peninsula, including two adjacent bays, Karaginsky and Olyutorsky Bays. Also included in this area are Karaginsky Island and the Govenia Peninsula. Karaginsky Island is comprised of both flat and more mountainous terrain, reaching 920 m at its highest elevation. There are numerous lakes and interior and coastal wetlands. Vegetation consists primarily of willow (*Salix* spp.), stone birch (*Betula ermani*), and dwarf shrub and tussock tundra (Newell et al. 1999). The Govenia Peninsula is a mountainous coastal area, reaching 1,300 m at its highest elevation. Vegetation of the area is primarily upland tundra, but forests of Siberian stone pine (*Pinus pumila*) also occur. Parapolsky Dol is an interior wetland area with many lakes and bogs (Zabelina et al., 1998).

**Outstanding Biological Features:** The marine realm of this priority region is the broadest and most shallow section of the continental shelf in the western Bering Sea. It provides important habitat for groundfish (yellow fin sole) and herring and it is the major spawning area for walleye pollock in the western Bering Sea. The Kamchatka Current influences the area, facilitating the exchange of nutrient-rich waters between onshore areas and the ocean basin.

Karaginsky Island is home to a rich flora and fauna characteristic of coastal habitats of the region. A total of 120 species of have been recorded for the area, of which as many as 91 breed on the island. Many of these species also use the area during migration and molting periods (Newell et al. 1999). Wetland habitats are used by several species of waterfowl, including some of the largest breeding densities of harlequin duck (*Histrionicus histrionicus*) in the Russian Far East.

The island is a breeding area for the southernmost population of Pacific walrus (*Odobenus rosmarus*) in the western Bering Sea and the surrounding Karaginsky Gulf is an important walrus feeding area. Other marine mammals found within Karaginsky Gulf are ice-associated seals [spotted (*Phoca largha*), ringed (*P. hispida*), and ribbon (*P. fasciata*), and bearded (*Erignathus barbatus*)], the gray whale (*Eschrichtius robustus*), fin whale (*Balaenoptera physalus*), and humpback whale (*Megaptera novaeangliae*). Substantial Steller sea lion (*Eumetopias jubatus*) rookeries are found on Karaginsky Island and to the north on Verkhoturova Island (National Marine Fisheries Service 1992, Boltnev and Mathisen 1996). The abundance of marine mammals and seabirds indicates a high concentration and diversity of marine invertebrates and fishes. Coyle et al. (1996) describe two faunistic groups of zooplankton, including nearly 30 species, for the region. Salmon (*Oncorhynchus* spp.) spawn within nearly all of the streams on the island and walleye pollock (*Theragra chalcogramma*) spawn in areas around the island and to the north near Cape Olyutorsk (Balykin 1996).

Parapolsky Dol is one of the greatest waterfowl reserves in northeast Asia, with the number of birds reaching 700,000 during the breeding season. The area is an important crossroads in the migration routes of waterfowl breeding in Yakutia (Central Siberia), Chukotka, and the Parapolsky Dol and wintering in China, Korea, Japan and other Asian countries. Approximately 180 species of birds occur here, of which 28 are waterfowl species and another 50 are wetland-dependent at various periods in their life cycles. Among the species that breed here are the black scoter (*Melanitta nigra*), oldsquaw (*Clangula hyemalis*), green-winged teal (*Anas crecca*), Eurasian wigeon (*Anas penelope*), Northern pintail (*Anas acuta*), tufted duck (*Anas fuligula*), greater scaup (*Aythya marila*). Some of Russia's rare and endangered species, such as the white-tailed eagle (*Haliaeetus albicilla*), gyrfalcon (*Falco gyrfalco*) and Osprey (*Pandion haliaetus*) breed here.

Nearly 30 seabirds colonies are scattered along the rocky coast of the Goven Peninsula (Zabelina et al. 1998). Steller sea lion (*Eumetopias jubatus*) rookeries and Pacific walrus (*Odobenus rosmarus*) haul-outs are also located along the Goven Peninsula (Boltnev and Mathisen 1996). Ocean areas are inhabited predominantly by gray whales (*Eschrichtius robustus*), but killer (*Orcinus orca*) and minke (*Balaenoptera acutorostrata*) whales also occur (Sobolevsky and Mathisen 1996). The abundance of marine mammals and seabirds indicates a high concentration and diversity of marine invertebrates and fishes. Fish here include Arctic grayling (*Thymallus arcticus*), five species of cisco (*Coregonus* sp), pike (*Esox* sp.), burbot (*Lota lota*) and gobs (*Gobiidae*).

**Current Conservation Status:** Karaginsky Island was designated as a regional-level special purpose preserve (zakaznik) to protect the numerous rocky cliff areas along the coasts that are used by breeding seabirds. However, this status means little for the conservation of the area. For instance, no permanent staff are assigned to manage, monitor, or protect the territory. The area is remote and little funds are available for local organizations and agencies to implement conservation programs here. An additional 5-km buffer zone surrounds the island for protection of marine resources but again, enforcement of this regime is unlikely given current economic conditions in the region. Coastal areas on Karaginsky Island have been recognized as a Wetland of International Importance (Ramsar Convention). An additional

zakaznik surrounds the neighboring Verkhoturova Island for the protection of marine mammals, notably Steller sea lion rookeries. This smaller island is also surrounded by a 3-km protective zone.

The Goven Peninsula and Parapolsky Dol, a wetland area, are encompassed by the Koryaksky Zapovednik (strict nature reserve). The Zapovednik, created in 1995, covers a territory of 327,200 ha., 83,000 of which are adjacent to the Bering Sea. While the Zapovednik does receive some international financial support, the reserve is still very young and not fully functioning as a conservation organization. Parapolsky Dol is also a Wetland of International Importance (Ramsar Convention). A 3-km marine buffer zone was established in the area from Vigenstiten Point to Khatyrka Point for the protection of marine mammal haul-outs. Despite this formal designation, a lack of enforcement may be allowing some violations of this conservation status. A temporary zakaznik (special purpose preserve) was established on the Belaya River in Parapolsky Dol.

**Current Resource Use:** Local Koryak people use Karaginsky Island for mushroom and berry picking and some historical seabird egg collecting may still take place. Some commercial fishing reportedly takes place in the area, and violations of the reserve and buffer area may be more frequent with inadequate enforcement. Resource use is not permitted within Parapolsky Dol, as the area is protected as a federal nature reserve. Both in Olyutorsky and Karaginsky Bays are important for the Russian commercial fishery, which targets pollock, herring, Pacific cod, saffron cod, salmon, halibut, and other flatfishes.

**Description of Threats:** Poaching of the valuable fisheries resources of this region is a threat to the fish themselves, as well as the many species that depend upon them. Restrictions on commercial catches are intended to conserve stocks, but enforcement in recent years may be problematic. In 1996, gold mining in the interior that could have adversely influence the watersheds of the region were halted as a result of public opposition.

**Relevant Conservation or Management Agencies:** Koryak Environmental Committee for Nature Protection, Kamchatka Institute of Ecology and Natural Resources, Kamchatrybvod (Kamchatka Territorial Board for the Preservation and Reproduction of Fish Resources and Regulation), TINRO (Pacific Research Institute of Fisheries and Oceanography)

**Area Description Contributors:** V. Burkanov, M. Williams

**Information Sources:** World Conservation Union (IUCN), Russia Program Office of World Wide Fund for Nature, Kamchatka Institute of Ecology and Natural Resources

## II. High Priority Areas

Map

ID#      Area Name

14 & 15      Eastern and Northern Norton Sound  
 16          Kasegaluk Lagoon and Ledyard Bay  
 17          Aleutian Basin

**Name:** Eastern and Northern Norton Sound

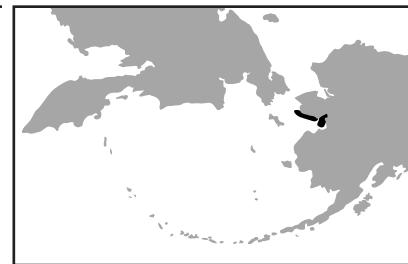
**Map ID number:** 14 & 15

**Subregion I:** Bering Strait/Southern Chukchi Sea

**Location:** Coastal and ocean areas of the southern Seward Peninsula and Eastern Norton Sound. The area includes coastal and ocean areas east to Cape Darby and south to Stuart Island.

**Approximate Size:** 16,867 km<sup>2</sup>

**Ownership:** State of Alaska, United States, Native Corporations



**Description of area:** Norton Sound is an eastern extension of the broad, shallow Bering Sea shelf that averages less than 50 m in depth. The coastline of the sound consists of cliffs, lagoons, and coastal wetlands. Beach environments range from rocky to muddy and attract intertidal fauna that are food sources for migrating and breeding shorebirds and marine mammals. Eelgrass (*Zostera marina*), an important habitat and food item for numerous invertebrate and vertebrate marine species (Orth 1992), is found within several of the coastal lagoon areas.

**Outstanding Biological Features:** Norton Sound is an important foraging area for many species. Coastal littoral and wetland areas are used by thousands of migrating shorebirds during spring and fall (Gill and Handel 1981), as well as by breeding birds of the area. Several species of shorebird also breed in these habitats, such as the red-necked (*Phalaropus lobatus*) and red (*P. fulicarius*) phalarope, western sandpiper (*Calidris mauri*), and dunlin (*C. alpina*). The coastal cliffs at Bluff and Square Rock west of Golovin Bay provide nesting habitat for about 150,000 seabirds. Northern Norton Sound is considered an important spawning area for red king crab (*Paralithodes camtschatica*), hair crab (*Erimacrus isenbeckii*), Pacific cod (*Gadus macrocephalus*), capelin (*Mallotus villosus*) and for harbor seal (*Phoca vitulina*) pupping. Areas of eastern Norton Sound are known for their abundances of beluga whale (*Delphinapterus leucas*), salmon (*Oncorhynchus spp.*), Pacific herring (*Clupea harengus pallasii*), and sand lance (*Ammodytes hexapterus*). Offshore areas of eastern Norton Sound are critical habitat in the fall for molting and foraging by spectacled eiders (*Somateria fischeri*), a threatened sea duck in North America, after their departure from breeding grounds on the Yukon-Kuskokwim Delta (Petersen et al. 1999a).

**Current Conservation Status:** Some of the land is owned by Native corporations and individuals, but much of the coastal area of Norton Sound as well as Square Rock and Sledge Island are managed by the Alaska Maritime National Wildlife Refuge (U.S. Fish and Wildlife Service). Marine areas have no formal protection here.

**Current Resource Use:** Native subsistence harvest of fish and marine mammals. Commercial harvest of herring, salmon, crab and halibut.

**Description of Threats:** Mismanagement of fisheries resources, upon which many seabirds, marine mammals, and native subsistence and commercial users depend, is of concern. Disturbance or pollution from transportation traffic through the area. Oil spills in any of these areas would have devastating impacts to wildlife habitats and fisheries resources.

**Relevant Conservation and Management Agencies:** Marine Mammal Commission, Kawerak Natural Resources, Eskimo Walrus Commission, Alaska Nanuq Commission, Norton Sound Economic Development, U.S. Fish and Wildlife Service

**Area Description Contributors:** M. Petersen, V. Byrd, A. Sowls

**Information Sources:** U.S. Fish and Wildlife Service, Alaska Biological Science Center (U.S. Geological Survey, Biological Resources Division)

**Name:** Kasegaluk Lagoon and Ledyard Bay

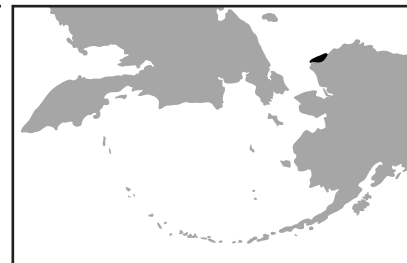
**Map ID number:** 16

**Subregion I:** Bering Strait/Southern Chukchi Sea

**Location:** Along the northeastern coast of Alaska, northwest of Bering Strait in the Arctic Ocean.

**Approximate Size:** 8,931 km<sup>2</sup>

**Ownership:** State of Alaska, United States, Native corporations



**Description of area:** Kasegaluk Lagoon is a 200-km long lagoon that is protected from the Chukchi Sea by a series of sparsely vegetated barrier islands and shoals. The Lagoon varies considerably in width and depth, with shallow water areas and mudflats in the southwesterly portion with deeper water (nearly 4 m) in the northeastern portion (Johnson et al. 1993). The Lagoon is ice covered for about 7 months of the year.

**Outstanding Biological Features:** This is an area of major summer concentrations of beluga whales (*Delphinapterus leucas*) which also has among the world's largest concentrations of spotted (*Phoca largha*), ringed (*P. hispida*), and bearded (*Erignathus barbatus*) seals. Gray whales feed in Ledyard Bay in summer and bowhead whales migrate through it in spring. Polar bears (*Ursus maritimus*) hunt for seals in the area and some females den along the coast. Johnson et al. (1993) found that the richness and diversity of bird species using Kasegaluk Lagoon were greater than in other lagoon systems in the Chukchi or Beaufort Sea. The seabird colony at Cape Lisburne which contains more than 270,000 Kittiwakes and murres is the largest in arctic Alaska. The majority of female and juvenile spectacled eiders from arctic Alaska molt in Ledyard Bay. Large numbers of Pacific black brant (*Branta nigra*) also stage in the lagoon during late August.

**Current Conservation Status:** Kasegaluk Lagoon and the seabird colonies at Cape Lisburne are part of the Alaska Maritime National Wildlife Refuge, but most of the buffer area around this site is private or state owned.

**Current Resource Use:** Traditional subsistence harvest of seabird eggs occurs at Cape Lisburne; walrus are often along the coast of Ledyard Bay, and beluga whales and spotted seals at Kasegaluk Lagoon.

**Description of Threats:** Development around the lagoon is a potential threat to this site.

**Relevant Conservation or Management Agencies:** Nanuuq Commission, Beluga Whale Committee, U.S. Fish and Wildlife Service

**Area Description Contributors:** A. Springer

**Name:** Aleutian Basin

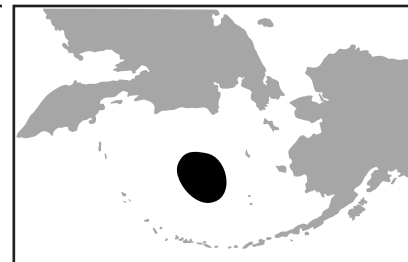
**Map ID number:** 17

**Subregion V:** Aleutian and Commander Basins

**Location:** South central Bering Sea

**Approximate Size:** 135,645 km<sup>2</sup>

**Ownership:** Joint Treaty



**Description of area:** The abyssal Aleutian Basin lies at a depth of 2,800 to 3,600 m. Reeburgh and Kipphut (1986) and others suggest that the deep, nutrient-rich waters of the Bering Sea must originate from the deep ocean and move north onto the continental shelf, by large and possibly chaotic processes (Reed and Stabeno 1990), where they are mixed upward to supply the nutrients required for high productivity. Dynamic physical processes create numerous oceanic eddies in the southeastern region and along the edge of the continental shelf: the role of eddies in the ecosystem is poorly understood, but they are known to be important to distribution and perhaps productivity of larval fishes such as pollock (Schumacher and Stabeno 1994).

**Outstanding biological features:** The basin is a high quality deep, pelagic habitat area. The Bering Sea is the terminus for the circulation of the world's deep ocean currents. Deep water formed in other high-latitude regions of the North Atlantic and Southern Ocean reaches the Gulf of Alaska and Bering Sea after traveling for centuries. These waters are therefore some of the oldest waters in the world's oceans and have very high nutrient concentrations (National Research Council 1996).

Large and little understood populations of mesopelagic fishes and squids, such as the northern lanternfish (*Stenobrachius leucopsarus*), perhaps the most abundant single species of fish in the Bering Sea. Lanternfish, other mesopelagic fish species, and squids are key prey of pollock (*Theragra chalcogramma*) and salmon especially in late autumn and winter and of great numbers of sperm whales (*Physeter macrocephalus*) and Dall's porpoises (*Phocoenoides dalli*) in summer. Most of the pollock stocks of the eastern and western Bering Sea spend summer feeding periods in the Basin.

**Conservation status:** A bilateral treaty between the US and Russia, but this does not provide formal protection for this area, and it mainly addresses how the fishery should be managed.

**Description of threats:** Overfishing, including illegal fishing, particularly in international waters of the basin known as the Donut Hole, and changing physical oceanographic conditions as a result of climate change (National Research Council 1996, Steele 1991), especially within the top 100 m (National Research Council 1996) are threats to biodiversity here.

**Relevant Conservation or Management Agencies:** National Marine Fisheries Service

**Area Description Contributors:** A. Springer

**Information Sources:** National Marine Fisheries Service

**Name:** Bering Sea Shelf Break

**Map ID number:** 18

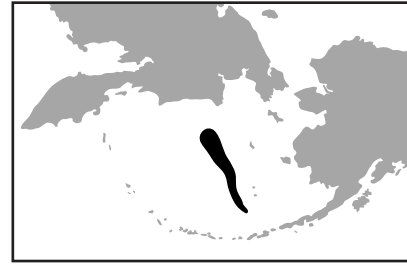
**Subregion II:** Bering Sea Shelf

**Location:** South central Bering Sea

**Approximate Size:** 78,670 km<sup>2</sup>

**Ownership:** Russian Federation and the United States

**Approximate Size:**



**Description:** The Bering Sea Shelf Break region includes the area between the 200 m and 2000 m isobaths. It varies in width from about 10 km to 100 km, depending on the steepness of the shelf edge, and contains three canyons—Pribilof, Zemchug, and Navarin. The Bering Slope Current flows along the shelf edge from the southeast to the northwest: it is a complex current that includes numerous eddies (Kinder et al. 1975; Kinder and Coachman 1977; Natarov 1963; Schumacher and Reed 1992). The eddies are clearly visible in modern satellite imagery. Most of the flow apparently diverges from the shelf edge at about 58°N and spreads across the basin (Stabeno and Reed 1994). Flow intensifies as a western boundary current off Cape Navarin and joins the southward flowing Kamchatka Current that returns water to the North Pacific Ocean. A portion of the current splits off near Cape Navarin and flows to the north, becoming the Anadyr Current that exits the Bering Sea through Bering Strait (Coachman et al. 1975). An oceanographic front extending some 1000 km overlies the continental slope year round (Kinder and Coachman 1978) and marks the transition between basin and shelf physics.

**Outstanding Biological Features:** This region, referred to as the Bering Sea Green Belt, is an area of enhanced biological activity important to the overall production budget of the Bering Sea (Springer et al. 1996). Annual primary production is elevated throughout summer and is approximately 60% higher than estimates for the adjacent continental shelf region and 270% higher than the basin. This in turn supports a high production and biomass of zooplankton, squids, and fishes. In winter, water temperatures at depth along the shelf edge are much warmer than bottom waters over the shelf, which attracts many species of fishes to the winter time thermal refuge.

Fishes that concentrate at the shelf edge for all or part of the year include chinook salmon (*Oncorhynchus tshawytscha*), salmon sharks (*Lamna ditropis*), Pacific Ocean perch (*Sebastes alutus*), sablefish (*Anoplopoma fimbria*), Pacific cod (*Gadus macrocephalus*), Greenland turbot (*Reinhardtius hippoglossoides*), arrowtooth flounder (*Atheresthes stomias*), and halibut (*Hippoglossus stenolepis*) (Bakkala et al., 1981; Best, 1981; Natarov and Novikov, 1970). The zooplankton, squids, and fishes attract large numbers of marine birds (Shuntov 1993) and mammals, including fur seals (*Callorhinus ursinus*), ribbon seals (*Phoca fasciata*), sea lions (*Eumetopias jubatus*), sperm whales (*Physeter macrocephalus*), blue whales (*Balaenoptera musculus*), fin whales (*B. physalus*), minke whales (*B. acutorostrum*), Stejneger's beaked whales (*Mesoplodon stejnegeri*), and Dall's porpoises (*Phocoenoides dalli*) (Kajimura and Laughlin, 1988; Lowry et al. 1982; Lucas 1899; Nishiwaki 1966; Nasu 1974; Okutani and Nemoto 1964; Omura 1955).

**Conservation Status:** None

**Current Resource Use:** Important region for the commercial groundfish fishery, where Pacific Ocean perch and other rockfish, Greenland turbot, sablefish, Pacific cod, and Pacific halibut are the chief targets.

**Description of Threats:** Over fishing.

**Relevant Conservation or Management Agencies:** National Marine Fisheries Service.

**Area Description Contributors:** A. Springer.

**Information Sources:** National Marine Fisheries Service, U.S. Geological Survey, U.S. Fish and Wildlife Service, University of Alaska Fairbanks.

### *III. Priority Areas*

Map ID

Number      Priority Area Name

19              Kronotsky Peninsula

20              Kamchatsky Peninsula

**Name:** Kronotsky Peninsula

**Map ID number:** 19

**Location:** Northeastern coast of the Kamchatka Peninsula

**Approximate Size:** 3,591 km<sup>2</sup>

**Ownership:** Russian Federation



**Description of area:** This area, dominated by 11 active volcanoes, (the highest reaching 3,528 m, that flank Lake Kronotsk), is covered by a large network of rivers, lakes, and active geysers. There is a diverse array of habitats, such as ocean coastline, interior wetlands and riparian areas, meadow, and alpine and upland tundra.

**Outstanding Biological Features:** The area contains a rich abundance of flora and fauna. Approximately 750 plant species, including 16 endemic species, have been recorded in the area. Two hundred and sixty species of birds have been recorded for the area, including the Steller's sea eagle (*Haliaeetus pelagicus*) and numerous seabirds that breed in colonies along the rocky coastline during summer. Nine species of cetaceans have been observed in coastal waters of the area, including Steller sea lion (*Eumetopias jubatus*) (National Marine Fisheries Service 1993).

**Current Conservation Status:** Site of Kronotsky Zapovednik (strict nature reserve), recognized as a UNESCO World Natural Heritage Site. The Zapovednik, established is one of Russia's oldest nature reserves. It covers an area of 1,142,000 hectares.

**Current Resource Use:** According to Newell et al. (1999), resource use in the area is basically non-existent due to the isolated location of the reserve from any roads or human habitation. However, eco-tourism opportunities are available and "tourists," particularly foreigners, may pay a fee to local private firms for access to the reserve to hunt, fish, hike, etc. As in other reserves, the reserve lacks the technology and transportation to adequately manage, monitor, and protect the biodiversity here.

**Description of Threats:** Weakened management and protection capacity in Koryaksky Zapovednik.

**Relevant Conservation or Management Agencies:** Kronotsky State Nature Reserve, World

Conservation Union (IUCN), Kamchatka Institute of Ecology and Natural Resources, Kamchatrybvod (Kamchatka Territorial Board for the Preservation and Reproduction of Fish Resources and Regulation)

**Area Description Contributors:** M. Williams, Burkanov

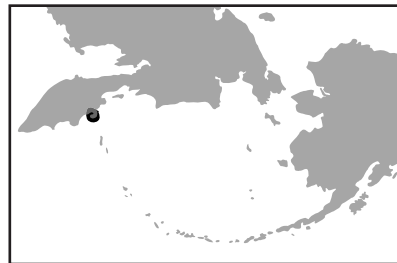
**Name:** Kamchatsky Peninsula

**Map ID Number:** 20

**Location:** Northeastern Kamchatka Peninsula, including Nerpichye Lagoon, Azabachiye Lake, and the lower part of the Kamchatka River.

**Approximate Size:** 10,479 km<sup>2</sup>

**Ownership:** Russian Federation



**Description of area:** Coastal lagoons and wetlands.

**Outstanding Biological Features:** The Azabachiye Lake watershed is an important area for sockeye salmon (*Oncorhynchus nerka*). Steller sea lion (*Eumetopias jubatus*) rookeries are located along coastal areas.

**Current Conservation Status:** A 6-km protective zone exists around Steller sea lion haul-outs along coastal areas, but is poorly enforced.

**Current Resource Use:** Unknown

**Description of Threats:** Mismanagement of fisheries resources, upon which many seabirds, marine mammals, and native subsistence and commercial users depend, is of concern. Pollution from mining activity in interior areas discharged into the Elovka River, a tributary of the Kamchatka River. Disturbance or pollution from transportation traffic along the coast of the Kamchatka Peninsula. Ocean debris frequently washed ashore and into areas of contact with marine mammals or seabirds.

**Relevant Conservation or Management Agencies:** Kamchatka Institute of Ecology and Natural Resources, Far Eastern Branch of the Russian Academy of Sciences (Vladivostok), Kamchatrybvod (Kamchatka Territorial Board for the Preservation and Reproduction of Fish Resources and Regulation)

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# **APPENDIX C**

## ***Atlantic Forest Ecoregion***

### ***Tri-national Biological Vision***

#### ***Workshop***

***April 24-26, 2000***

# Workshop

## *Toward a Biological Vision for the Paraná/Paraíba Interior Atlantic Forest Ecoregion*

April 25-26, 2000,  
Foz do Iguaçu, Paraná, Brazil

### SUMMARY REPORT

WWF convened a workshop April 25-27 to advance development of a biological vision for the Paraná/Paraíba Interior Atlantic Forest ecoregion. Thirty-six partners and WWF staff gathered in Foz do Iguaçu, Brazil, to design a landscape of priority nucleus areas and corridors in the tri-national region to effectively address the four goals of biodiversity conservation:

1. *Representation of all distinct natural communities*
2. *Maintenance of ecological and evolutionary processes that create and sustain biodiversity*
3. *Maintenance of viable populations of species*
4. *Conservation of blocks of natural habitat large enough to be resilient to large-scale stochastic and deterministic disturbances and long-term changes.*

Specifically, the workshop's objectives were to:

1. Produce a map of the distribution of biodiversity;
2. Identify priority areas for biodiversity conservation;
3. Define minimum area requirements for viable populations and processes;
4. Complete a preliminary identification of threats and opportunities for the ecoregion's biodiversity and make recommendations for immediate action;
5. Identify information gaps for refining and monitoring the achievement of the biological vision.

In addition, the workshop was designed to develop among the participants an understanding of the ERBC process and strengthened continuing collaboration and commitment to ERBC.

In preparation for the workshop, various partner organizations in Paraguay and Argentina were contracted to collect and compile the best data available for fauna and flora distributions, geomorphologic and socio-economic aspects in such a way as to be compatible with the information already collected for Brazil in the PROBIO national Atlantic Forest workshop held in August 1999. Due to delays in these groups completion of the data collection and technical difficulties with combining the data in a single GIS system, the maps integrating this information with the recently completed tri-national maps of forest cover were not available for proofing or use in analysis during the workshop. This step is now being completed in separate meetings in each country. The data compiled will be made available to all participants. These problems actually served to convince participants of the importance of sharing information for analysis

across institutional and country borders, an important achievement in a region where information has been perceived by institutions as a tool to secure power.

With the highest diversity of microhabitats (local endemism and beta diversity) in the world, the group was faced with the challenge of representing in the landscape design all natural communities in the Atlantic Forest Ecoregion complex. The group realized that the existing data on species distribution are not sufficient. Although it is possible to say where species exist, the lack of systematic surveys over the entire ecoregion makes it impossible to confirm where species do not exist. The situation is further complicated by the current reduced and fragmented state of the remaining forest cover. The group decided to use data on physical aspects (enduring features) which are available for the entire ecoregion, in a model to predict the distribution of biodiversity in the original area of Atlantic Forest. The assumption is that heterogeneity of physical characteristics will indicate heterogeneity of species composition. The group reached a consensus on the variables to be used in the model: vegetation, altitude, hydrological index, dry season, occurrence of frosts, soils (organic material, depth, and saturation), geographical relief, and watersheds. The data not available at the workshop (evapotranspiration for Brazil and Paraguay, comparison and correlation of geographical relief using the database at WWF-Brasil, and review of climate data to establish the frequency and intensity of frosts) will be collected in the next two weeks. The results from the model should be ready for further analysis shortly thereafter. A preliminary trial of the model with the variables chosen yielded 700 possible combinations or representation units for the Paran /Paraiba Interior Atlantic Forest ecoregion.

The workshop made it possible to incorporate expert opinion to make the preliminary identification of priority nucleus areas and connecting corridors as well as preliminary analysis of threats and opportunities to recommend immediate conservation actions. To complete this task, one transnational group identified priority areas for flora and another group identified priority areas for fauna using the recently completed base map of remaining forest cover. After a discussion of the concept of minimum viable areas required by area-sensitive species, the plenary group decided to consider three umbrella species: jaguar (*Panthera onca*), harpy eagle (*Harpia harpyja*), and white-lipped peccary (*Tayassu pecari*) in adjusting the boundaries of the priority areas identified to achieve viable areas for these species. The group would like to have considered as umbrella species parrots or bellbirds, which migrate according to fruit species availability, but the current lack of knowledge about these species' requirements limits their utility for this purpose. The attached map is a preliminary version of the integrated priority nuclear areas and the linking areas. More adjustments will need to be made after the groups have a chance to verify the results integrated for flora and fauna.

Overarching threats identified for the ecoregion were in order of priority:

- Demographic pressure
- Cultural models of development that negatively impact the environment
- Lack of information and capacity for sustainable use and conservation
- Undervaluing the forest
- Regional poverty and marginalization

- Perverse incentives
- Lack of land use planning compatible with conservation
- Weak law enforcement and regulatory agencies
- Expansion of the agricultural frontier

Overarching opportunities identified for biodiversity conservation of the ecoregion include:

- Diverse markets available for sustainable products and services
- Motivation and creativity in the region for alternative sustainable production
- Existence of technologies and information about conservation

Discussion of these threats and opportunities underlined the implications of the demographic pressure on the Province of Misiones in Argentina, where the largest block of remaining Atlantic Forest is located. The province, which is the poorest in Argentina, is undergoing a population explosion due to migrations from other parts of Argentina as well as from Brazil and Paraguay. This population explosion is significantly increasing pressure on the forests. It was suggested that a cartographic representation of the corridors of human expansion would help to analyze trends and develop actions to reduce their negative impact. A powerful additional threat is the large-scale agricultural and forest monocultures (which substitute native forest) as well as large infrastructure such as highways and dams. The many hydroelectric dams in the region that have recently flooded a significant portion of the biodiversity of the region were also cited as an opportunity. Today these enterprises are interested in protecting the forests surrounding their reservoirs and this could present an opportunity for conservation action, markets for organic products, and biodiversity corridors.

The group began a process of analysis of opportunities and threats for each landscape unit designed to identify priority actions that could be taken immediately to advance the conservation of the biodiversity of the landscape unit.

The workshop was very successful in strengthening the partnership among the participating organizations as well as an understanding of the ERBC process and a commitment to implementing ERBC in the ecoregion. The lessons learned that participants most often cited in the workshop evaluation were:

*Work in teams helps to achieve the objectives and that ERBC is an appropriate process for conservation.*

Regarding the workshop methodology, the majority of the participants cited *the participatory process and the tri-national exchange to define the priority areas and construct the biological vision.*

Next steps to complete this first version of the biological vision include:

1. Revision of the portion of the PROBIO results within the Parana/Paraiba Interior Atlantic Forest ecoregion to verify integration with workshop results (by June 15)

2. Complete the report of the workshop and disseminate to the participants (by May 20 - completed)
3. Distribute the draft-integrated maps resulting from the workshop to participants for verification and corrections by June 16. (see copy attached)
4. Organize working groups by country to complete the matrix (analysis) of threats/opportunities and recommended actions for all the priority areas identified.
5. Partners to follow up with developing priority actions identified in the ERBC process.
6. Develop a strategy for dissemination of the completed Vision.

Partners at the Federal University of Pernambuco have nearly completed a proposed landscape design for the Pernambuco Coastal and Interior Forests ecoregions using the same methodology as was used for the Paraná/Paraíba Interior Atlantic Forests. A representative of this group (Marcello Tabarelli) attended the Paraná Paraíba workshop, contributing to a rich discussion concerning the methodologies to be applied for developing a biological vision at the Ecoregion Complex and at the ecoregion levels.

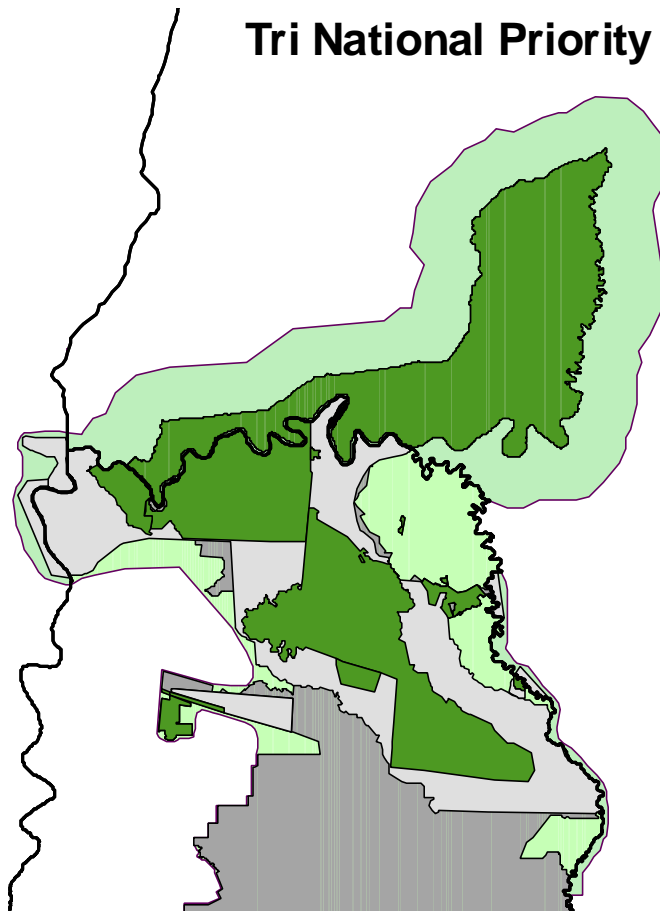
Data compilation at the Atlantic Forest complex level has resulted in a tri-national base map of current and original forest cover as well as vegetation and physical elements and protected areas. WWF will be evaluating the process and developing a strategy for encouraging application of a refined methodology by WWF and other institutions to complete a vision for the other Atlantic Forest ecoregions and for the whole Ecoregion Complex.

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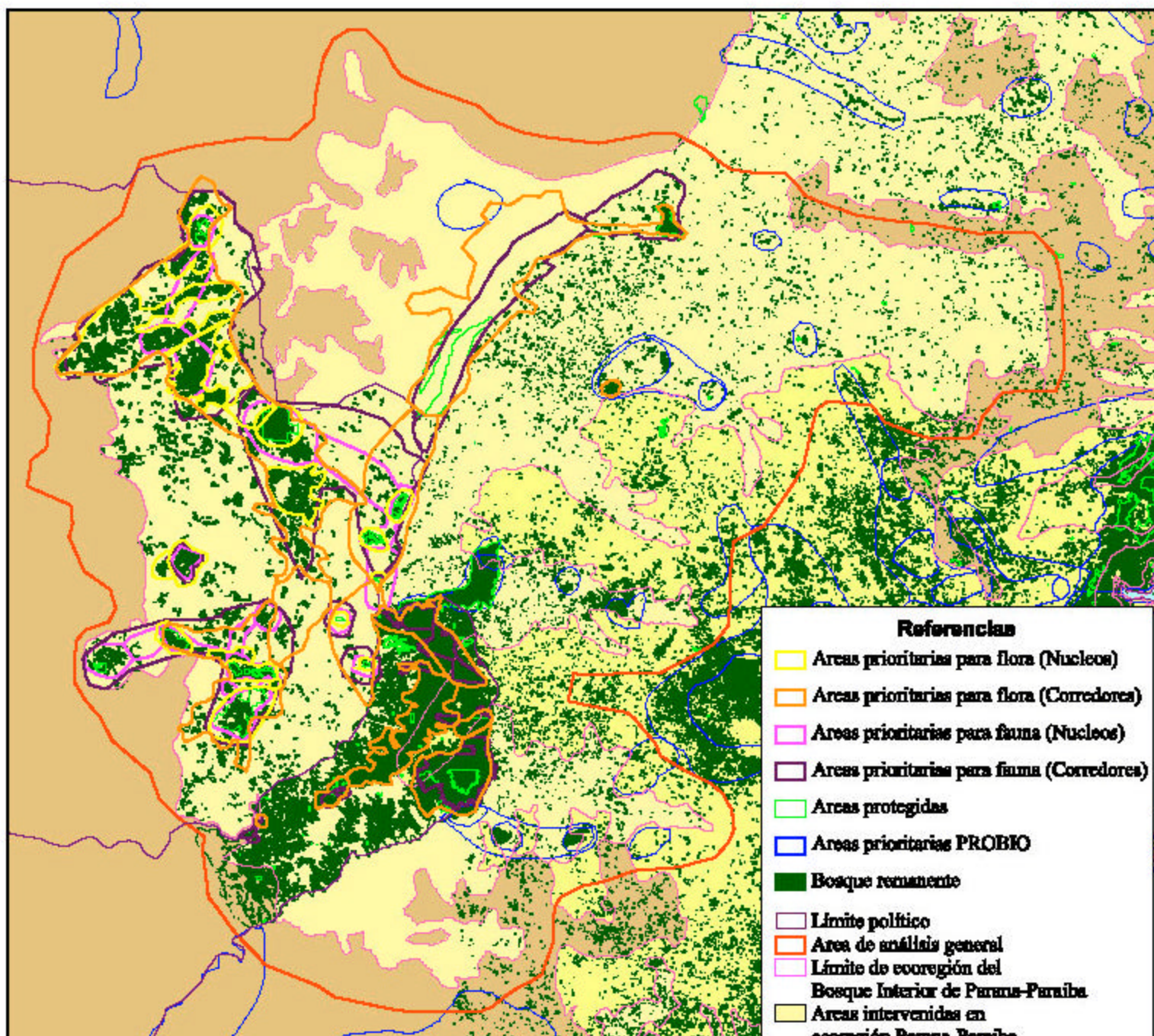
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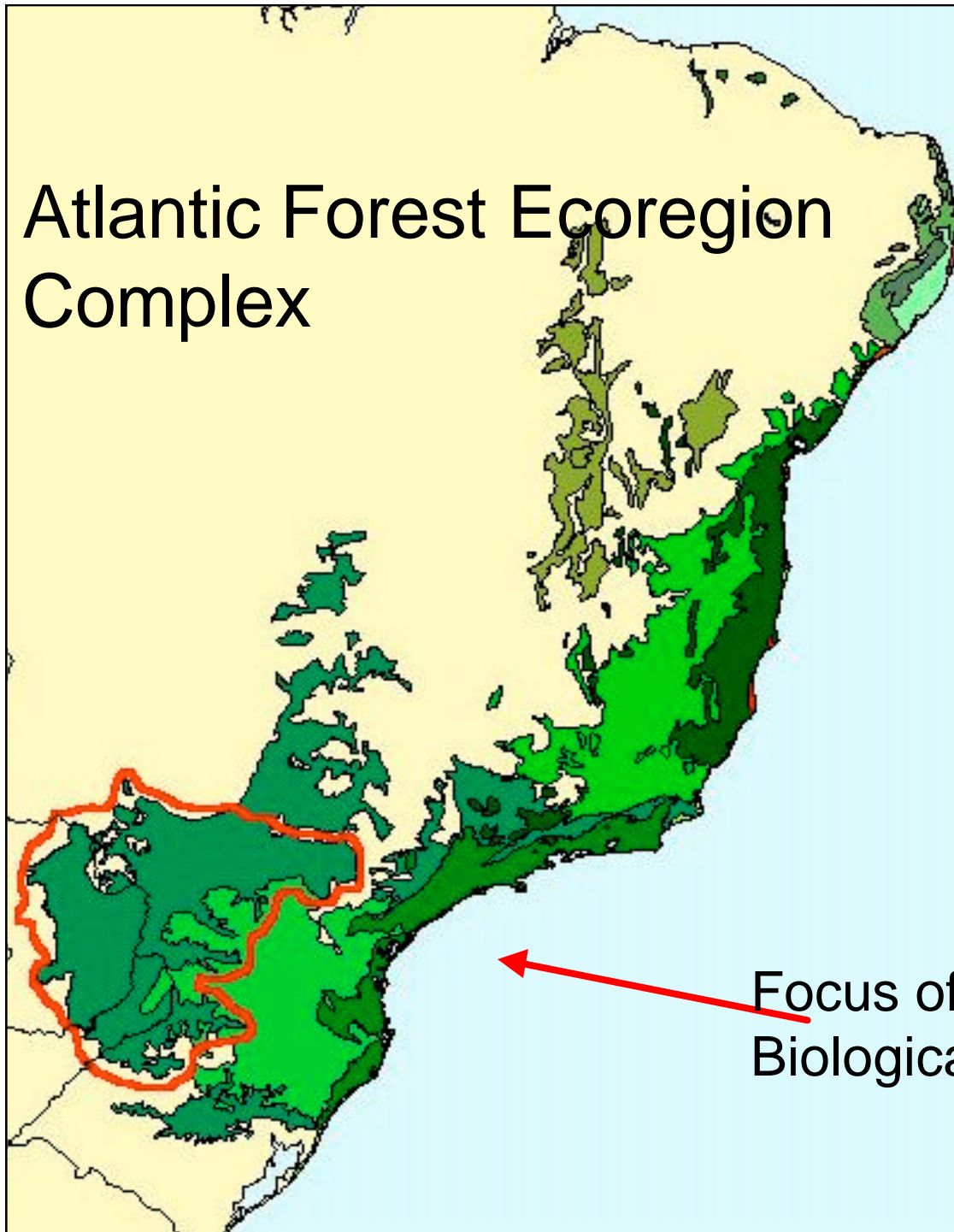
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# Atlantic Forest Ecoregion Complex



Focus of April 26-27, 2000  
Biological Vision Workshop